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VOLUME 52

NUMBER 1

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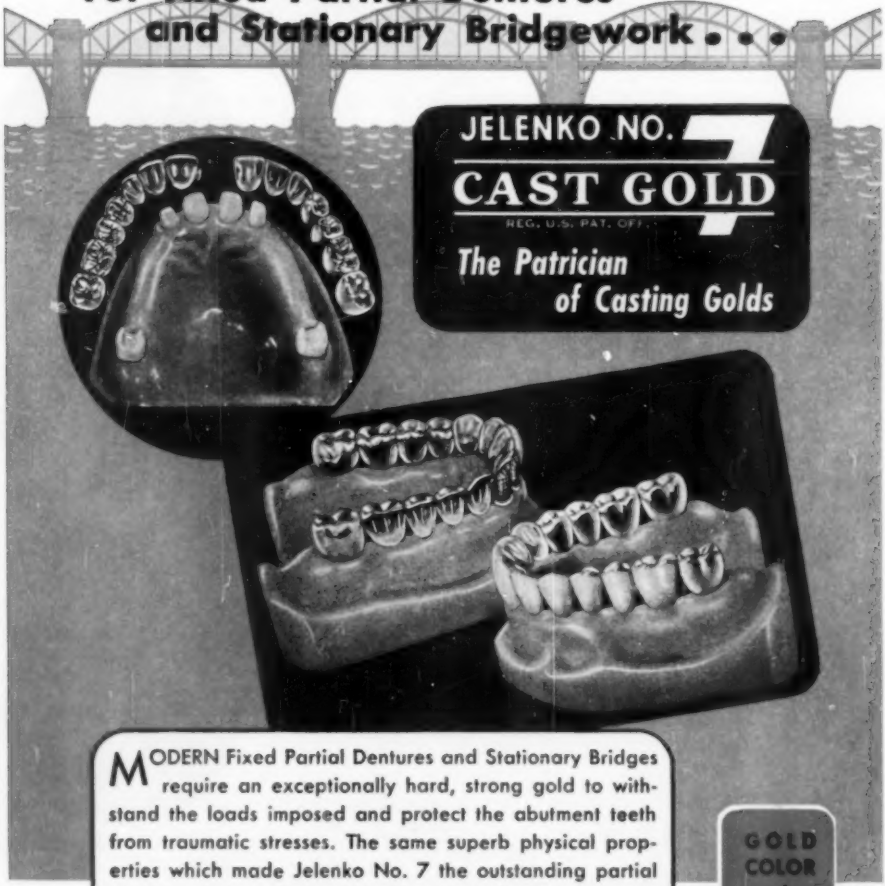

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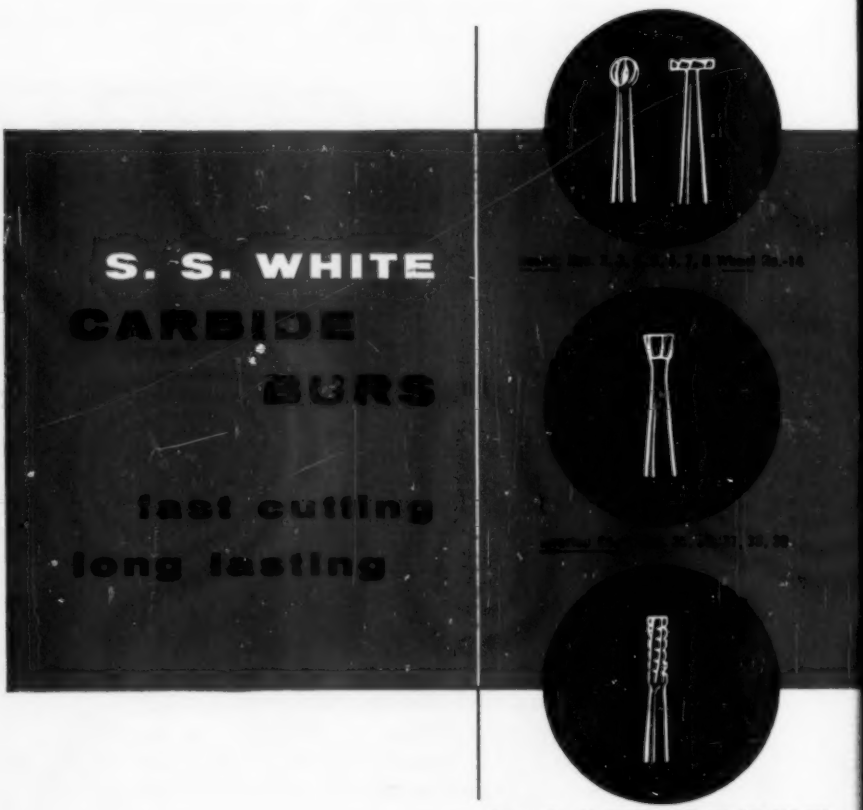

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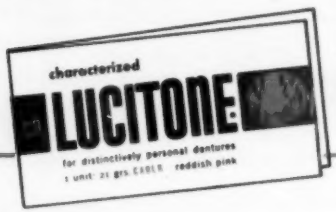

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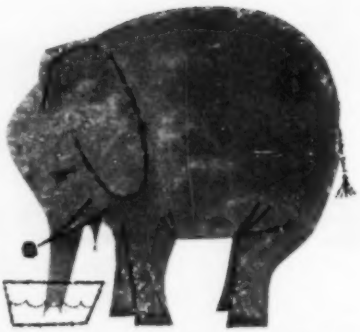

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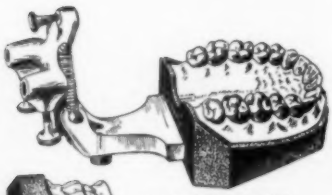

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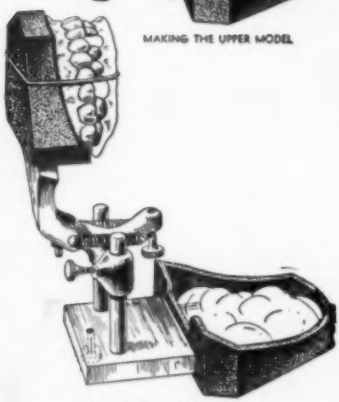

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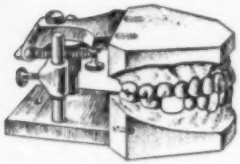

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JANUARY 1956 VOLUME 52 • NUMBER 1

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Fluorine in the control of dental caries

H. Trendley Dean, D.D.S., Chicago

The year 1955 marks the tenth year of fluoridation in three North American cities. After extensive clinical examinations of the school population, fluoridation of the public water supply began early in 1945 at Grand Rapids, Mich., Newburgh, N. Y., and Brantford, Ontario. Also in 1945, 5,116 children, 4 through 16 years of age, were examined at Aurora, Ill., one of the cities which had provided outstanding evidence of the dental health value of a domestic water containing optimal amounts of fluoride. From these examinations at Aurora, dental caries prevalence rates, specific for age, were computed and plotted as an "expectancy curve," or the level of dental caries experience which might reasonably be expected in cities with fluoridated water supplies after the passage of an adequate period of time.

Today the dental caries experience rates for the 6, 7, 8, 9 and 10 year old children in the three cities mentioned closely approximate the "expectancy curve" of Aurora recorded a decade ago. After nine years of fluoridation, the overall prevalence rates show a reduction of nearly 60 per cent when compared with prefluoridation dental caries experience. The results from these three cities evidence the gradual transition of the theory of fluoridation into a scientific law. An increasing number of reports from numerous other independent studies, notably Evanston, Ill., merely augment the overwhelming mass of scientific evidence now being recorded in the literature. What was a hope of a decade ago is now a truism of preventive dentistry. The most ubiquitous of crowd diseases—dental caries—has been brought under a large measure of control by means of fluoridation—a method safe, efficient and inexpensive.

Presented as part of the symposium, "Dental caries control," before the Section on Operative Dentistry, ninety-sixth annual session, American Dental Association, San Francisco, October 17, 1955.

Secretary, Council on Dental Research.

HISTORY

Literature • During the past decade and a half, the history of the relation of fluorine to dental health has been frequently and thoroughly reviewed. A few of these reviews may be cited.[1-7] The literature is now so voluminous that it is impossible to become familiar with more than a fractional part. The library of the Kettering Laboratory of the University of Cincinnati has developed a complete bibliography on the subject of the relation of fluorine to health. As of July 1955, they have recorded 8,500 references to articles in the literature.[8] The compilation includes natural occurrence, methods of analysis, and various uses; hence, all references do not deal with physiological effects. The magnitude of the fluorine literature, however, is apparent.

Endemic Dental Fluorosis (Mottled Enamel) • The epidemiological studies on endemic dental fluorosis are now largely of historical interest. As a precursor of knowledge of the dental caries-fluorine relationship, these studies provided a background of training and experience whence many of the methodologies were derived and subsequently applied in the dental caries studies.

A particular epidemiological characteristic of the endemic dental fluorosis studies was the large number of individuals exposed to a determinable constant (a public water supply of a known fluoride concentration). This condition provided an unusual opportunity for studying physiological effects by the epidemiological method. It may be noted (Fig. 1) that each increase in the antecedent cause (fluoride in the water supply) results in a commensurate consequent effect (the community index of dental fluorosis). The consistency of this pharmacologic response provided strong assurance that a 1.0 ppm of fluoride (F.) concentration was well within the limits of public health safety, insofar as dental fluorosis was concerned—an observation fundamental in the subsequent dental caries control studies.

Fluorine and Dental Caries • A lowered prevalence of dental caries had been noted in the earliest of the mottled enamel studies, long before the discovery of the etiological agent—fluorine—in 1931. With knowledge available in respect to causation of mottled enamel, development of a method of water analysis sensitive to 0.1 ppm of fluoride (F.), and the gradual refinement of methods permitting the measurement of dental caries experience quantitatively, field surveys to measure the epidemiological characteristics of this phenomenon began. The numerous details of the various field surveys pertaining to the fluorine-dental caries relationship may be studied in the literature.[2,4,5,7]

The most extensive field survey involved a study of 7,257 white children, age 12 to 14 years, in 21 cities of four states. This investigation revealed the fact that children using domestic waters containing as little as 1.0 ppm of fluoride (F.) experience only a half to a third as much dental caries as children using relatively fluoride-free waters (Fig. 2).

Numerous experimental studies in the

1. Moulton, F. R., editor. Fluorine and dental health. Lancaster, Pa., Science Press, 1942.

2. Moulton, F. R., editor. Dental caries and fluorine. Washington, D. C., American Association for the Advancement of Science, 1946.

3. Shaw, J. H., editor. Fluoridation as a public health measure. Washington, D. C., American Association for the Advancement of Science, 1954.

4. Cox, G. J. Fluorine and dental caries. A survey of the literature of dental caries, Publ. 225, National Academy of Sciences. Washington, D. C., National Research Council, 1952.

5. Dean, H. T. Fluorine; water-borne fluorides and dental health. In Dentistry in public health, Pelton, W. J., and Wisan, J. M., editors. Philadelphia, W. B. Saunders Co., 1949.

6. Arnold, F. A., Jr. Fluorine: systemic, oral, environmental, experimental and control aspects. In Dentistry in public health, Pelton, W. J., and Wisan, J. M., editors. Philadelphia, W. B. Saunders Co., 1949.

7. Russell, A. L. Prevention and control of dental caries. In Dentistry in public health, ed. 2., Pelton, W. J., and Wisan, J. M., editors. Philadelphia, W. B. Saunders Co., 1955.

8. Campbell, I. R. Personal communication, July 28, 1955.

laboratory, and selected bacteriological studies, consistently confirmed the field observations. Later studies by Russell and Elvove[9] and Adler[10] demonstrated that the protective effects of fluoride domestic waters extend well into middle age.

With the discovery of the quantitative relationship within limits between the fluoride concentration of the domestic water and the prevalence of dental caries in the populations using such waters during their lifetime, fluorine as a control measure for dental caries became the object of world-wide research. Some of the major methods of applying fluorine as a preventive measure will be examined briefly.

FLUORINE IN THE CONTROL OF DENTAL CARIES

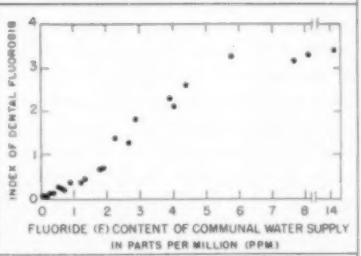
At present, fluorine is being utilized in the control of dental caries in three principal ways: (1) fluoridation of water supplies, (2) topical application, and (3) by prescription of fluorides for individual use (tablets or solution).

Fluoridation • After the demonstration of the quantitative relationship between the fluoride content of the domestic water supply and the dental caries experience of the population using such waters, the obvious next step was an attempt to duplicate this purely natural phenomenon by a simple chemical adjustment of the fluoride content of the public water supply to a level which field surveys had shown to be most desirable for dental health. This adjustment was a simple procedure in treatment processing and no

9. Russell, A. L., and Elvove, E. Domestic water and dental caries, VII—a study of the fluoride-dental caries relationship in an adult population. Pub. Health Rep. 66:1389 Oct. 26, 1951.

CITY AND STATE	CHILDREN: NUMBER EXAMINED	CHILDREN: PERCENT AFFECTED	FLUORINE CONCENTRATION (PPM) IN PUBLIC WATER SUPPLY	PERCENTAGE DISTRIBUTION OF SAMPLE ACCORDING TO DEGREE OF DENTAL FLUOROSIS: NORMAL	QUESTIONABLE	VERY MILD	MILD	MODERATE	SEVERE	INDEX OF DENTAL FLUOROSIS
BAUXITE ARK.	26	100.0	14.1			3.9	3.9	38.5	53.8	3.4
ANKENY IOWA	21	100.0	8.0				9.5	47.6	42.8	3.3
CHETOPA KAN.	65	100.0	7.6			9.2	21.5	10.8	58.5	3.2
POST TEX.	38	100.0	5.7				10.5	50.0	39.5	3.3
LUBBOCK TEX.	189	97.8	4.4	1.1	1.1	12.2	21.7	46.0	17.8	2.7
CONWAY SO. CAR.	59	88.2	4.0	8.1	8.7	20.4	32.2	23.7	11.9	2.1
AMARILLO TEX.	289	90.3	3.9	3.1	6.6	15.2	28.0	33.9	13.2	2.3
PLAINVIEW TEX.	97	87.6	2.9	4.1	8.3	34.0	26.8	23.7	3.1	1.8
COLO. SPRGS. COLO.	404	73.8	2.6	6.4	19.8	42.1	21.3	8.9	1.5	1.3
CLOVIS N.M.	138	71.0	2.2	13.0	16.0	28.9	35.4	11.0	0.7	1.4
GALESBURG ILL.	275	47.6	1.9	25.3	27.1	40.3	6.2	1.1		0.69
ELMHURST ILL.	170	40.0	1.8	28.2	31.8	30.0	8.8	1.2		0.67
JOLIET ILL.	447	25.3	1.3	40.5	34.2	22.2	3.1			0.46
AURORA ILL.	633	15.0	1.2	53.2	31.8	13.9	1.1			0.32
KEWANEE ILL.	123	12.2	0.9	52.8	35.0	10.6	1.6			0.31
PUEBLO COLO.	614	6.8	0.6	72.3	21.2	6.2	0.3			0.17
ELGIN ILL.	403	4.2	0.5	60.5	35.3	3.5	0.7			0.22
MARION OHIO	263	6.1	0.4	57.4	36.5	5.3	0.8			0.25
LIMA OHIO	454	2.2	0.3	84.1	13.7	2.2				0.09
ZANESVILLE OHIO	459	1.5	0.2	85.4	13.1	1.5				0.08
MICHIGAN CITY, IND.	236	0.0	0.1	97.5	2.5					0.01
WAUKEGAN ILL.	423	0.2	0.0	97.9	1.9	0.2				0.01

VARIATION OF INDEX OF DENTAL FLUOROSIS WITH FLUORIDE CONCENTRATION OF THE COMMUNAL WATER SUPPLY



PUBLIC HEALTH SIGNIFICANCE OF INDEXES FALLING WITHIN SPECIFIED RANGES

0.0-0.4 NEGATIVE; 0.4-0.6 BORDER LINE	INDEXES OF LITTLE OR NO PUBLIC HEALTH CONCERN RESPECTING THE DEVELOPMENT OF ENDEMIC DENTAL FLUOROSIS, HIGHLY IMPORTANT FROM STANDPOINT OF DENTAL CARIES PREVALENCE	0.6-1.0 SLIGHT 1.0-2.0 MED. 2.0-3.0 MARKED 3.0-4.0 VERY MARKED	REMOVAL OF EXCESSIVE FLUORIDES IN WATER IS RECOMMENDED

Fig. 1 • Relation between fluoride domestic waters of various concentrations and the degree of severity of endemic dental fluorosis (mottled enamel). Observations of 5,824 white children of 22 cities of ten states. (Compiled from Dean, H. T. American Association for the Advancement of Science publication no. 19, 1942)

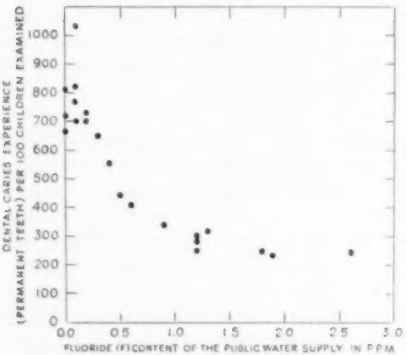


Fig. 2 • Relation between amount of dental caries (permanent teeth) observed in 7,257 selected 12-14 year old white school children of 21 cities of four states and the fluoride (F.) content of public water supply (From Dean, H. T.; Arnold, F. A., Jr., and Elvove, E. Pub. Health Rep. 57:1155 Aug. 7, 1942)

more involved than the addition of other chemicals to the water supply for the purpose of purification or the removal of odors, tastes, or hardness.

Early in 1945, Grand Rapids, Mich., Newburgh, N. Y., and Brantford, Ontario, began fluoridation. After nine years of fluoridation in Grand Rapids, the reduction in the amount of dental caries in the 6, 7, 8, 9 and 10 year old children is of the order of 76.0, 62.2, 52.3, 53.0 and 51.0 per cent, respectively. At Newburgh, when comparisons are made with the prefluoridation rates, the reduction in the same age groups is 76.5, 52.7, 51.2, 63.9 and 40.7 per cent, respectively. On the same basis of comparison, the reduction at Brantford is 65.0, 66.3, 51.7, 47.2 and 42.6 per cent, respectively. The prevalence rates for the 2,223 Aurora children, age 6 through 10 years, are also given in the table, so that the reader may compare the results observed in Grand Rapids, Newburgh and Brantford with the "expectancy curve," (table and Fig. 3 and 4). Such consistency in these and other independent studies provides direct evidence that dental caries and its sequelae can be brought under a large measure of control through fluoridation of the public water supply.

In the United States, the method of choice is fluoridation, which specifically may be defined as the chemical adjustment of the fluoride (F.) content of the public water supply to a level optimal for dental health. As of October 1, 1955, there were 1,115 communities in the United States, with a combined population of 22,104,455 persons, which were using fluoridated water.[11] In addition, there were about 3,000,000 more persons who were using domestic water supplies which naturally contained 1.0 ppm, or more, of fluoride (F.). Cities which are now fluoridating their public water supplies include such large cities as Philadelphia, Baltimore, Pittsburgh, Washington, San Francisco, Milwaukee, Buffalo and St. Louis. Cities where the public water supplies naturally contain about 1.0 ppm of fluoride (F.) are Denver, Colo., Cheyenne, Wyo., and Aurora, Ill. A number of Canadian cities are also utilizing this control measure. Other countries where one or more cities are known to be fluoridating the public water supply are Brazil, Chile, Colombia, Germany, Holland, Japan and Sweden.

Topical Application • Approximately 40 per cent of the people of the United States are not users of a public water supply. For this segment of the population, the topical application of fluoride solutions was developed. Recent reviews of this method include those of Bergman,[12] Bibby and Brudevold,[13] Sundvall-Hagland[14] and Russell.[7] According to

10. Adler, P. Der Kariesschutz bei erwachsenen durch natürlich fluor-haltiges Trinkwasser. Deutsch., Zahn-, Mund- und Kieferheilk. 15:24, 1951.

11. American Dental Association, Council on Dental Health. Dental Health Highlights 11:40 Oct. 1, 1955.

12. Bergman, G. The caries inhibiting action of sodium fluoride. Acta Odont. Scandinavica 11: supp. 12, 1953.

Russell,[7] in a nation-wide demonstration, beginning in 1948, several million American children were treated using the standardized Knutson technic which Russell describes as follows:

This treatment technic begins with a thorough cleansing of the coronal surfaces of the teeth; a motor driven rubber cup and fine pumice paste may be used. The cleansed teeth are then isolated from saliva with No. 2 cotton rolls with ends cut at 45 to 60 degree angles. With appropriate holders, half of the mouth —an upper and the opposing lower quadrant —may be isolated at one time (243). The rolls must be clear of the teeth, so that they do not absorb the applied solution. The teeth are then dried with compressed air. A 2 per cent solution of sodium fluoride in distilled water is flowed over the dried crowns with a cotton applicator or a light spray so that all

13. Bibby, B. G., and Brudevold, F. The external action of fluorides and other agents on the teeth in the prevention of dental decay. In Fluoridation as a public health measure. Shaw, J. H., editor. Washington, D. C., American Association for the Advancement of Science, 1954.

14. Sundvall-Hagland, I. Sodium fluoride application to the deciduous dentition—a clinical study. Stockholm, Tryckeri Aktiebolaget Thule, 1955.

Table • Comparison of dental caries prevalence rates in continuous resident children at Grand Rapids, Mich., Newburgh, N. Y., and Brantford, Ont., before fluoridation and after approximately nine years of fluoridation

Age	1945 examinations*		Prefluoridation 1944–45		Nine years of fluoridation 1953–54		Per cent reduction in decayed, missing and filled permanent teeth, (DMFT)**
	Number of children examined	Number of DMFT** per child	Number of children examined	Number of DMFT** per child	Number of children examined	Number of DMFT** per child	
	Aurora		Grand Rapids				
6	473	0.280	1,789	0.775	1,010	0.186	76.0
7	516	0.705	1,806	1.886	410	0.712	62.2
8	469	1.042	1,647	2.945	390	1.405	52.3
9	368	1.522	1,639	3.898	623	1.833	53.0
10	397	2.020	1,626	4.921	499	2.413	51.0
	2,223		8,507		2,932		
			Newburgh				
6			403	0.404	74	0.095	76.5
7			394	1.033	94	0.489	52.7
8			355	1.946	80	0.950	51.2
9			407	3.113	73	1.123	63.9
10			447	4.007	61	2.377	40.7
			2,006		382		
			Brantford				
6			556	0.40	476	0.14	65.0
7			616	1.66	510	0.56	66.3
8			614	2.44	433	1.18	51.7
9			608	3.18	324	1.68	47.2
10			565	3.80	287	2.18	42.6
			2,959		2,030		

*From: Pub. Health Rep. 68:141-148, Feb. 1953.

**DMFT: Decayed, missing and filled permanent teeth.

Compiled from data kindly furnished by F. A. Arnold, Jr., for Grand Rapids, D. B. Ast, for Newburgh, and W. L. Hutton, for Brantford.

N.B. Aurora data included in table so that reader may compare nine year observations at Grand Rapids, Newburgh and Brantford with "expectancy curve."

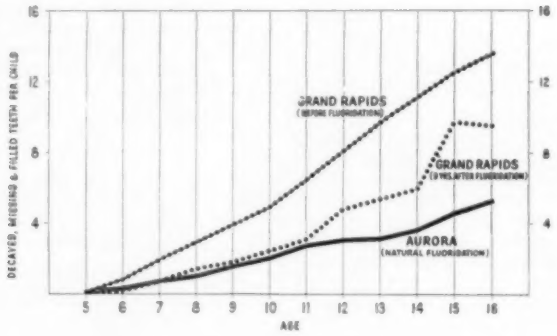


Fig. 3 • Decayed, missing and filled permanent teeth per child, nine years after fluoridation, Grand Rapids, Mich. (From Arnold, F. A., Jr. J. Tennessee D.A. 35:126 April 1955)

surfaces are visibly wet. The applied solution is permitted to dry in air for about three minutes. The second, third, and fourth applications (which are not preceded by a prophylaxis) are given at intervals of about one week (232).

Optimal treatment ages were estimated as 3, 7, 10 and 13 years, on the theory that fluoride should be applied as soon as practicable after eruption of a tooth, to minimize the period of time at risk from caries before treatment.[7] This method has proved effective in reducing the incidence of dental caries in children to the extent of about 40 per cent. Its value in inhibiting dental caries in adults is questionable.

In communities where the public water supply contains natural fluoride at the optimal level, limited studies indicate that topical applications of fluorides fail

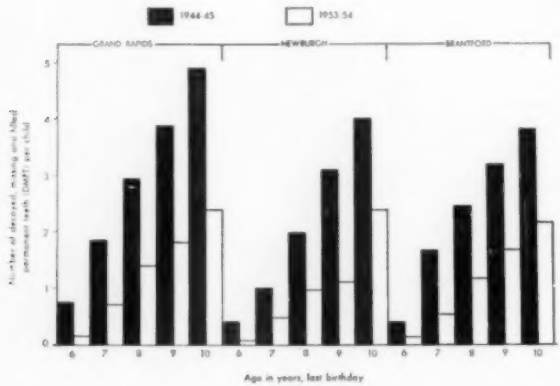


Fig. 4 • Comparison of dental caries prevalence rates in continuous resident children at Grand Rapids, Mich., Newburgh, N. Y., and Brantford, Ontario, before fluoridation and after approximately nine years of fluoridation

to provide additional benefit. The majority of the topical application studies utilized aqueous solutions of sodium fluoride; other fluoride compounds have been used with varying results.

Schmidt's report[15] indicates that topical applications of fluorides have been extensively utilized in recent years in Denmark, England, Finland, Germany, Holland, Hungary, Italy, Sweden, Switzerland and Yugoslavia.

Fluoride Tablets • An extensive program has been instituted in Switzerland[16] in an attempt to control dental caries through the administration of fluoride tablets to school children. Held and Piguet,[17] in a preliminary report of a study of 6 year old school children, which continued three years, reported that compressed sodium fluoride tablets were effective in reducing the incidence of dental caries. With the report of positive results, the practice has spread rapidly, and approximately 500 Swiss communities are using this method of caries prevention.[16] Apparently the tablets are distributed in the primary schools; the method of administration, if any, of the fluorine prophylaxis to preschool children and infants is not known. A recent communication from Schmidt[18] indicates that prophylaxis by means of fluoride tablets is also being administered in the State of Hessen, Germany.

Use of fluoride tablets has been limited in the United States. Dietz[19] has reported a study involving a small number of children. Positive results were reported. Bibby, Wilkins and Witol[20] state that the use of fluoride lozenges may contribute to the control of dental caries, and that the effects are probably the result of fluorine acting on external surfaces of the teeth. The number of persons observed was relatively small and the duration of the study only 12 to 14 months.

In discussing the question of using fluoride tablets beginning at five or six years of age (first school year), certain presumptive evidence from fluoridation studies might be kept in mind. From the behavior of the results that Russell[21] is obtaining in his studies in Montgomery and Prince Georges Counties, Md., the ingestion of fluorides after the period of tooth formation may not give the same protective effect as ingestion during the period of calcification. Effects observed in the earlier fluoridation studies support this inference; for example, the present dental caries prevalence rates in the Grand Rapids children who were six years old when fluoridation started (now 16 years old) as compared to those of the 16 year old, Aurora, Ill., children who have used fluoride water all during their lifetime. It would seem logical, in the light of present evidence, to assume that an appreciable measure of protection would be lost if fluoride tablets were used by children only after starting to school, even if fluoride tablets are theoretically as effective as fluoride-bearing water.

Another point to be borne in mind is that from the standpoint of effective public health application, the individual administration of fluoride tablets presents more difficulties than a broad community action, such as fluoridation. As a large portion of a child's permanent teeth are calcified prior to six years of age (normal

15. Schmidt, H. J., secretary-general, European Organization for Research on Fluorine and Dental Caries Prophylaxis. Mimeographed report, received August 10, 1955.

16. Note entitled "Le problème du fluor et l'attitude des autorites sanitaires et medico-scolaires dans les cantons helvétiques." Program booklet, 2nd meeting of the European Organization for Research on Fluorine and Dental Caries Prophylaxis, Geneva, May 17, 18 and 19, 1955, p. 21-23.

17. Held, A. J., and Piguet, F. Prophylaxie de la carie dentaire par les comprimés fluorés: premiers resulttats. Bull. l'Acad. Suisse des Sciences Médicales (Basel), 10:249 Oct. 1954.

18. Schmidt, H. J. Personal communication, July 21, 1955.

19. Dietz, V. H. Sodium fluoride tablets in the precision control of dental caries, J. Missouri D. A. 33:7 Dec. 1953.

20. Bibby, B. G.; Wilkins, E., and Witol, E. A preliminary study of the effects of fluoride lozenges and pills on dental caries. Oral Surg., Oral Med. & Oral Path. 8:213 Feb. 1955.

21. Russell, A. L. Personal communication, Aug. 26, 1955.

time to enter primary school), a high degree of intelligent participation on the part of each mother, an alertness against waning interest, and a daily constancy of purpose measurable in years, is essential. The health education question posed by the tablet method of application becomes highly important if any degree of success is to be attained.

In the light of present available evidence, prophylaxis by means of fluoride tablets cannot be evaluated properly until carefully controlled studies, including adequate numbers of children and observed over the necessary number of years, are available. At the present time, such studies are not available. From the standpoint of theoretical physiology, there would seem no reason why fluoride tablets should not be effective, providing some method can be found to ensure their conscientious daily consumption, at least over the period of tooth calcification. Because of the health education essential for their success it might be well, for the present, to limit the use of fluoride tablets in the control of dental caries to prescription by the dentist. When all considerations are weighed, it would seem that in a community having a public water supply, the most economical and efficient manner of applying the fluorine prophylaxis to the greatest number of people is through fluoridation of the domestic water.

ADVENT OF PREVENTIVE DENTISTRY

Fluoridation should noticeably change the practice of dentistry in the next generation. With dental caries being brought under a large measure of control, it may easily be visualized that dentistry would undergo a gradual transition from a practice preoccupied with an unending demand for dental repair to the more satisfying practice of a comprehensive oral health service, based on the sound biological principles of preventive dentistry.

The considerable increase in dental research within recent years is constantly adding to the body of scientific knowledge. This furtherance of knowledge improves existing control measures and adds new ones.

In one of the lectures given during the 1948 series of Laity Lectures of The New York Academy of Medicine, Dr. J. B. Conant,[22] in discussing pure and applied science, said:

> The difficulties of providing for the entire Nation certain types of health services now purchased by the upper income group appear insuperable. Take dentistry as an example. The number of dentists required to provide adequate dental care for all the citizens of the United States is staggering; the cost of such care on a public basis would be so large as to be beyond the possibility of the taxpayers' supporting. The only real answer to dental caries therefore lies in the realm of preventive medicine. The research worker and the development man (the dentists concerned with public health) must find an answer in terms of preventing the decay of teeth. As you know, there are already a few promising signs in this direction.

The foregoing paragraph provides an excellent point on which to terminate this paper. When the contemporaneous thought of 1948 is considered in relation to the demonstrated facts just presented, the remarkable strides made by preventive dentistry in that time are apparent. The evidence that dental caries can be brought under a large measure of control by fluoridation is conclusive beyond a reasonable doubt. Today is none too soon to start extrapolating these and other research findings, in order to envision the practice of dentistry in the next generation.

22. Conant, J. B. The inter-relation of pure and applied science in the field of medicine. Perspectives in Medicine, the March of Medicine, 1948. New York, Columbia University Press, 1949.

Enzyme inhibitors as a factor in the control of dental caries

L. S. Fosdick, Ph.D., Chicago

During the past decade, knowledge of enzymes with respect to living processes has had an amazing growth. It is now known that most of the living processes are governed by enzymes, and it is known that many of the vitamins, hormones and drugs for the combatting of disease act by virtue of their effects as coenzymes or their accelerating or inhibitory effects on enzymes.

According to the chemicoparasitic theory of dental caries, this disease is intimately associated with the enzymatic degradation of carbohydrate on the tooth surface to lactic and other acids.[1,2] In 1936 it was suggested that the usual Embden-Meyerhof scheme of anaerobic glycolysis of sugars took place in the mouth during the formation of pyruvic and lactic acids, and subsequently the intermediates of these reactions were isolated from fermenting saliva-sugar mixtures.[3,4] It was later demonstrated that substances which inhibit the glycolytic enzymes would prevent acid formation in sugar-saliva mixtures.[5,6] Thus, as enzymes cause the acids to form, it was suggested that enzyme inhibitors could be employed for the control of dental caries.

ENZYME INHIBITOR THEORY

To date all of the methods that have been successful in controlling dental caries have either directly or indirectly prevented acid formation on the tooth surface or have made the tooth more resistant to acids. Thus, the theory that enzyme inhibitors may be used for the control of dental caries seems most attractive. Attempts to apply this method, however, contrary to the views expressed on certain radio and television programs, have not met with uniform success.

A review of the fundamental conditions under which an enzyme inhibitor should be effective in the control of dental caries may reveal why this method of caries control has not been very successful. There are two primary requisites for the effective applications of the theory:

1. The inhibitor must prevent fermentation to lactic acid. This may be accomplished by inactivating one or more of

Presented as part of the symposium, "Dental caries control" before the Section on Operative Dentistry, ninety-sixth annual session, American Dental Association, San Francisco, October 17, 1955.

Professor of chemistry, Northwestern University Dental School.

1. Easlick, K. A., editor. Dental caries: mechanism and present control technics as evaluated at the University of Michigan workshop. St. Louis, C. V. Mosby Co., 1948.

2. Barron, E. S. G. Mechanisms of carbohydrate metabolism. Advances Enzymol. 3:149, 1943.

3. Fosdick, L. S., and Hansen, H. L. Theoretical considerations of carbohydrate degradation in relation to dental caries. J.A.D.A. 23:401 March 1936.

4. Fosdick, L. S. Carbohydrate degradation by mouth organisms. I. J.A.D.A. 26:415 March 1939.

5. Calandra, J. C.; Fancher, O. E., and Fosdick, L. S. The effect of synthetic vitamin K and related compounds on the rate of acid formation in saliva. J. D. Res. 23:31 Feb. 1944.

6. Carbon, J. A., and others. The inhibition of anaerobic glycolysis by sodium N-lauroyl sarcosinate. Arch. Biochem. & Biophys. 55:356 April 1955.

the glycolytic enzymes, or by interfering with the normal metabolic process of the acidogenic microorganisms.

2. The inhibitor must be at the site of acid formation at the time the substrate or sugar is present.

If these two requisites are met, then the rate at which acids form on the tooth surface should be materially reduced. If, because of any general or local condition, either of these requisites is not satisfied, however, acids will form from fermentable sugars.

Under the conditions that exist in the mouth, just how might these requisites be attained? Compounds that will meet the first requirement are obtained easily. There are hundreds of compounds that will block acid formation effectively. Most quinones, antiseptics, heavy metals, antibiotics, and numerous other compounds are active. Furthermore, most of the synthetic detergents that are commonly used in modern dentifrices, or even soap, will effectively block acid formation. Manly,[7] with a new screening technic in which salivary sediment is used, has found many compounds that will block acid formation. Even chocolate in sugar seems to have a slight inhibitory effect. Thus, if the simple inhibition of acid formation were the sole requisite, the control of dental caries by enzyme inhibitors would long ago have been successful.

The second requisite, however, is not so easily attained. The inhibitor must be at the site of acid formation at the time the substrate or sugar is present. Most substances, when placed in the mouth, are immediately diluted and washed away by saliva. Tests on the clearance from the mouth of such compounds as quinones, urea, ammonium ions, many detergents and sugar, in the Northwestern University laboratory and others, indicate that within 20 to 90 minutes after their use they or their effects can no longer be found in the mouth or on the tooth surface, although in some instances they may persist in deep carious lesions for a longer period of time.

Even if an inhibitor could be fastened in the mouth in some manner, there is the question of penetration of the dental plaque. Before a compound can be effective it must penetrate the plaque to the site of acid formation.

APPLICATION OF THEORY

With the foregoing considerations in mind, just what has been done in the prevention of dental caries by means of enzyme inhibitors? There are two logical procedures that may be attempted. The inhibitor may be placed in the mouth by means of a dentifrice, mouthwash, chewing gum or lozenge, or it may be incorporated in sugar or confections. To date the first method seems to be the more popular. With this method, however, it is extremely difficult if not impossible, to fulfill completely the second requirement.

Most dentifrices contain substances that effectively block acid formation *in vitro*. In fact, the old soap chalk dentifrice was successful in this regard, but few people would claim any anticariogenic effects for this type of dentifrice aside from the normal effects of good oral hygiene. It was not until 1953 that a mechanism for the retention of the enzyme inhibitor *in situ* for long periods of time was suggested.[8] It was proposed that if inhibitors could be found which would attach themselves to the dental plaque by absorption, adsorption, or chemical combinations and then remain active *in situ*, a dentifrice for the control of caries might be possible. Under these conditions the active ingredient would become attached to that portion of the

7. Manly, R. S. Enzyme inhibitors for dentifrices. J. Soc. Cosmetic Chem. 5:266 Dec. 1954.

8. Fosdick, L. S., and others. A new approach to the problem of dental caries control. J. D. Res. 32:486 Aug. 1953.

dental plaque that remains after the teeth are brushed, which by coincidence is, in the main, that under which dental caries normally occurs.

In vitro screening procedures were devised and it was found that very few compounds would fulfill the requirements of the tests.[9] In the laboratory at Northwestern University only penicillin, chlortetracycline, oxytetracycline, tyrothricin, sodium N-lauroyl sarcosinate, sodium dehydroacetate, a few furan derivatives and a few small molecular weight peptides were effective. It is interesting to note that among the hundreds of noneffective inhibitors are menadione, copper chlorophyllin, ammonia-urea combinations, many alkyl sulfate detergents, and glyceric aldehyde. Only a few out of hundreds were found to be effective, however, when this screening technic was used.

Other screening technics were devised, primarily by Manly. He screened 2,500 compounds and found approximately 10 per cent effective.[10] In many instances compounds that were effective in one test were inactive in another, and in many instances other investigators failed to check the results when the same tests were used.[11] This does not detract from the theory, but indicates more accurate tests must be devised.

The inhibitors that have been screened *in vitro* and tested for caries control in animals are ammonia-urea combinations, chlortetracycline, copper sulfate, copper chlorophyllin, dehydroacetic acid, sodium dehydroacetate-oxalate mixtures, glyceric aldehyde, iodoacetic acid, penicillin G, sodium N-lauroyl sarcosinate, oxytetracycline, tyrothricin, and synthetic vitamin K. Of these compounds, only ammonia-urea combinations, penicillin, sodium N-lauroyl sarcosinate, sodium dehydroacetate-sodium oxalate combinations, and tyrothricin have been tried in dentifrices on human beings. All of these latter will block acid formation in saliva-sugar mixtures. The qualitative results of these experiments are shown in the table.[12-29]

Of the compounds tested on animals, the low urea-ammonium combinations, glyceric aldehyde, vitamin K and dehydroacetic acid were not effective. Copper chlorophyllin in the drinking water reduced caries in female hamsters but

9. Fosdick, L. S.; Ludwick, W. E., and Schantz, C. W. The absorption of enzyme inhibitors and antibiotics in dental plaques. J.A.D.A. 43:26 July 1951.

10. Manly, R. S. Personal communication.

11. Forscher, B. K., and Hess, W. C. Validity of plaque pH measurements as a method of evaluating therapeutic agents. J.A.D.A. 48:134 Feb. 1954.

12. Davies, G. N., and King, R. M. The effectiveness of an ammonium ion toothpowder in the control of dental caries. J. D. Res. 30:645 Oct. 1951.

13. Dirks, O. B.; Winkler, K. C., and Van Aken, J. A reproducible method for caries evaluation. III. Tests in a therapeutic experiment with ammoniated dentifrice. J. D. Res. 32:18 Feb. 1953.

14. Chernausek, D. S., and Mitchell, D. F. Ammoniated dentifrices and hamster caries. II. The effectiveness of brushing the teeth with a control and an ammoniated dentifrice. J. D. Res. 30:393 June 1951.

15. Bruckner, R. J.; Hill, T. J., and Wollpert, B. J. Measurement of dental caries incidence in school children using a sodium bicarbonate dentifrice. J. D. Res. 31:105 Feb. 1952.

16. Stephan, R. M.; Harris, M. R., and Fitzgerald, R. J. The effect of penicillin and of terramycin on the development of buccal, labial, proximal and occlusal surface dental caries in rats and on quantitative counts of oral microorganisms. (Abst.) J. D. Res. 31:475 Aug. 1952.

17. Hein, J. W. Effect of copper sulfate on initiation and progression of dental caries in the Syrian hamster. (Abst.) J. D. Res. 32:654 Oct. 1953.

18. Hill, T J.; Simms, J., and Newman, M. The effect of penicillin dentifrice on the control of dental caries. J. D. Res. 32:448 Aug. 1953.

19. Zander, H. A., and Bibby, B. G. Penicillin and caries activity. J. D. Res. 26:365 Oct. 1947.

20. Kerr, D. W., and Kesel, R. G. Two-year caries control study utilizing oral hygiene and an ammoniated dentifrice. J.A.D.A. 42:180 Feb. 1951.

21. Shaw, J. H. Studies on the effect of dl-glyceric aldehyde on the dental caries activity in white rats and cotton rats. J. D. Res. 29:23 Feb. 1950.

22. Dale, P. P., and Powell, V. H. Inhibition of experimental dental caries in the rat by iodoacetic acid. J. D. Res. 22:33 Feb. 1943.

23. Zander, H. A.; Lisanti, V. F., and Shiere, F. R. Validity of hamster studies in caries control. J. D. Res. 30:139 Feb. 1951.

24. Cohen, A., and Donzanti, A. Two-year clinical study of caries control with high-urea ammoniated dentifrice. J.A.D.A. 49:185 Aug. 1954.

25. Zander, H. A. The effect of a penicillin dentifrice on caries incidence in school children. J.A.D.A. 40:569 May 1950.

26. Hein, J. W., and Shafer, W. G. Further studies on the inhibition of experimental caries by sodium copper chlorophyllin. (Abst.) J. D. Res. 30:510 Aug. 1951.

27. Shaw, J. H. Ineffectiveness of sodium copper chlorophyllin in prevention of experimental dental caries. New York D. J. 16:503 Nov. 1950.

28. Forbes, J. C., and Smith, J. D. Studies on the effect of metallic salts on acid production in saliva. I. II. J. D. Res. 31:129 Feb. 1952.

29. Shiere, F. R. Personal communication.

was ineffective in white rats. Chlortetracycline, copper sulfate, iodoacetic acid, penicillin, oxytetracycline and tyrothricin were very effective in reducing caries when given in the drinking water or food. Sodium dehydroacetate and sodium dehydroacetate-oxalate mixtures were effective in some tests, but the results of low and high urea-ammonium combinations, potassium, penicillin G powder, procaine penicillin, sodium N-lauroyl sarcosinate, sodium dehydroacetate-oxalate combination, and tyrothricin. In these experiments, only the low urea-ammonium combinations and procaine penicillin were ineffective. Potassium

Table • Results of various tests for the effect of inhibitors on acid formation and dental caries

Compound	Acid formation tests		Caries tests	
	Inhibition	Absorption	Animal	Human
Ammonia	+	−	−	+
				−
Low urea				−
				−
				−
High urea	+	−	No experiment	+
Chlortetracycline	+	+	+	No experiment
Copper chlorophyllin	+	−	+	No experiment
Sodium dehydroacetate	+	+	±	No experiment
Copper sulfate	+	+	+	No experiment
Dehydroacetic acid	+	−	−	No experiment
Glyceric acid	+	−	−	No experiment
Iodoacetic acid	+	+	+	No experiment
Penicillin G	+	+	+	+
			+	
			+	
Procaine penicillin	+	No experiment	No experiment	−
Sodium N-lauroyl sarcosinate	+	+	+	+
Sodium dehydroacetate+ oxalate	+	+	+	+
Oxytetracycline	+	+	+	No experiment
Tyrothricin	+	+	+	+
Vitamin K	+	−	−	+ (After meals)

+ Shows activity.
− Shows no activity.

were inconclusive in others. When the inhibitors were given to rats or hamsters, those that were found to absorb on protein reduced caries activity. Those that did not absorb did not reduce caries activity.

Unfortunately, experiments on the use of enzyme inhibitors for the control of dental caries in human beings are comparatively few. To date clinical experiments have been performed with the use penicillin G, sodium N-lauroyl sarcosinate, sodium dehydroacetate-oxalate mixture, the high urea-ammonium combinations and tyrothricin were effective and the results statistically significant. Unfortunately, none of the results, with the exception of those on the ammonium-low urea combination, have been checked by two independent observers. Furthermore, only the high urea-ammonium combination, sodium N-lauroyl sarcosi-

nate, and sodium dehydroacetate-sodium oxalate combination are available to the public generally.

DISCUSSION

If effective dentifrices are so few and in general unsubstantiated by check experiments, why then does nearly every major dentifrice manufacturer claim antienzyme activity for his product? It is only necessary to view television, listen to the radio, or read dentifrice advertisements to learn that almost every dentifrice today has enzyme inhibitors present that will stop acid formation, decrease the microbial population and make it unnecessary to brush after each meal. Actually, it is true that most dentifrices contain enzyme inhibitors, but most of these inhibitors are not retained in the mouth or on the tooth surface for more than 20 to 90 minutes. With or without an inhibitor, one brushing with a dentifrice will decrease the microbial population of the mouth by millions of organisms, but the effect is ephemeral. Hence, most of the ads do have some basis of truth; all dentifrices, when properly used, will decrease the microbial population of the mouth, but only for a short period of time. Many dentifrices will decrease acid formation in a test tube, but only a few will prevent acid formation on the tooth surface for many hours after use.

The most likely application of enzyme inhibitors for the control of dental caries has not been tried on human beings. If an inhibitor could be found that could be incorporated directly into the sugar or confection, no acid could be formed from that sugar or confection. This, from the theoretical point of view, would be an ideal method of caries control.

There are two major objections to this method of control, however. In the first place, any substance that will inhibit glycolysis in the mouth will also inhibit glycolysis in muscle tissue if the inhibitor gains access to the vascular system in high concentrations. This is not a problem in the dentifrice field, but in the food industry may be of major importance.

The second objection is of less serious consequence. The inhibitor would prevent fermentation in any sugar in which it was present. Thus, the sugar would be unsuitable for any process dependent on fermentation.

SUMMARY

In summary, it can be stated that, from a theoretical point of view, the use of enzyme inhibitors is very attractive. From a practical point of view there are many factors that make the application of the theory extremely difficult. In animal experiments, at least ten enzymes inhibitors have been used successfully in the control of dental caries. In human experiments, penicillin, high urea-ammonium combinations, sodium N-lauroyl sarcosinate, sodium dehydroacetate-sodium oxalate combinations and tyrothricin have been successfully used in dentifrices with statistically significant results. Of these, only three are generally available to the public. In similar experiments, the low urea-ammonium combinations and procaine penicillin failed to reduce caries activity significantly when used in dentifrices.

Of all those tested on human beings, only one—that with the low urea-ammonium combination—has been checked by two independent investigators. Thus, it would seem that enzyme inhibitors may be used for the control of dental caries, and as knowledge increases, new applications in dentistry may be expected just as in the other biological sciences.

The mechanism of dental caries

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The cost of control and repair of dental and other oral disease in this country is estimated at one and one-half billion dollars per year. Most of this cost is due to the ravages of dental caries. It is estimated that the current rate of dental decay is six times as great as the rate of dental repair. Through research much has been learned about the nature of the process of dental caries; and through the dissemination of this knowledge in the lay press and commercial advertising media, the public has been alerted to the fact that much dental decay can be prevented. The ultimate solution of the problem of dental caries will lie in the comprehensive method or group of methods that can be applied to all people at a minimum expense of time, effort and money.

MECHANISM OF CARIES PROCESS

There are two major theories as to the mechanism of dental decay. W. D. Miller, in the latter part of the last century, through his bacteriological research, may be said to be the greatest promulgator of the acidogenic or chemicoparasitic theory.[1] His findings and speculations remain the basis for this most widely believed concept. The second theory is concerned with proteolysis of organic portions of the dental tissues. In 1869 Heider and Wedl advanced such a concept which since has been supported by such investigators as Gottlieb, Frisbie and others.[2] It is very possible that both of these mechanisms may be a part of the process of decay.[3] On the side of proof, however, it is clear that agents or technics which presently control or prevent caries are most frequently associated with the acidogenic concept.

An oversimplification of these concepts could be shown as a formula:[4]

Bacteria → enzymes + substrate = attacking agent // tooth

By substitution of appropriate words such as "acidogenic" or "proteolytic", this formula may be used to describe the mechanism involved in both of the concepts mentioned.

The caries process is a local activity on the tooth surface—enamel, or exposed cementum or dentin—which takes place within and beneath an invisible plaque consisting of bacteria and their products, food and cellular debris.[5,6] The location

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1. Miller, W. D. Microorganisms of the human mouth. Philadelphia, S. S. White Dental Mfg. Co., 1890.

2. Frisbie, H. E. Modern concept of the etiology of dental caries: proteolytic theories. Internat. D. J. 1:15 Sept. 1950.

3. Bodecker, C. F., and Bodecker, H. W. C. Bacterial destruction of dental enamel. J. D. Res. 9:37 Feb. 1929.

4. Mitchell, D. F. Evaluation of caries control procedures. Minneap. Dist. D. J. 36:33 June 1952.

5. Williams, J. L. Contribution to the study of pathology of enamel. D. Cosmos 39:353 May 1897 (cont. from previous issues).

6. Mitchell, D. F., and Johnson, M. J. Nature of the gingival plaque in the hamster—production, prevention and removal. J. D. Res. Submitted for publication, 1954.

is usually on tooth surfaces protected from the self-cleansing action of foods and the toothbrush. The process is intermittent, occurring especially for periods of 30 minutes or more immediately after the ingestion of sugars.[7]

In the plaque, the "factory" for the caries process, acid-producing microorganisms elaborate enzymes during their normal metabolic activities, which in turn convert a substrate, sugar, to an attacking agent of an acid nature (such as lactic acid and its precursors) which disintegrates the inorganic material of the tooth. Thus the plaque furnishes the attacking agent and serves to hold it, with some degree of protection from salivary dilution, against the tooth surface.

In addition, proteolytic bacteria are probably involved in the process. They too release enzymes which may "lyse" or dissolve the protein or organic portions of the dental tissues. Consideration of such an hypothesis helps to explain how the organic cuticular structures of the enamel surface, the glycoprotein of the interrod substance, and the organic matrix of the dentin can be destroyed by the caries process. Also, it may be that protein hydrolysis may liberate acids strong enough to affect the inorganic tooth structures.

Some of the research supporting this theory or combination of theories includes the following:

1. Clinical bacteriological studies indicate a relationship between *Lactobacillus acidophilus* and other aciduric bacteria and a high incidence of dental caries.[8]

2. Caries susceptible animals do not develop the disease unless they are fed high carbohydrate diets.[9,10]

3. Animals raised in a germ-free environment are not susceptible to caries when fed a high carbohydrate diet; but when their counterparts in open laboratories are fed the same diet, in the presence of microorganisms, caries does develop.[11]

4. Caries susceptible animals which are fed high carbohydrate diets by stomach tube, thus avoiding local contact with the teeth, do not develop caries.[12]

5. Certain antibiotics prevent dental caries, presumably because of their antibacterial activity.[13]

Many systemic factors appear to be related to caries susceptibility; however, their collective practical significance at this time is far outweighed by that of the local factors described here. For example, heredity undoubtedly plays a role in caries resistance as demonstrated in rats by Hunt and his co-workers[14] and indicated by studies of families of human beings; however, this is of no great practical importance in the case of the 30,000,000 school children of this country who show some degree of susceptibility approaching 95 per cent.

The "adequate diet" is thought by some to prevent decay, and yet in many areas of the world which are notorious for the existence of malnutrition there is a relatively low incidence of caries. The fact that the attack rate of caries varies

7. Stephan, R. M. Intra-oral hydrogen ion concentrations associated with dental caries activity. J. D. Res. 23:257 Aug. 1944.

8. Jay, P. Effect of substrate on oral flora. J.A.D.A. 37:416 Oct. 1948.

9. Hoppert, C. A.; Webber, P. A., and Canniff, T. L. The production of dental caries in rats fed an adequate diet. Science 74:77, 1931.

10. Arnold, F. A., Jr. The production of carious lesions in the molar teeth of hamsters (C. auratus). Pub. Health Rep. 57:1599 Oct. 23, 1942.

11. Orland, F. J. Oral environmental factors in experimental rat caries. In Advances in experimental caries research, Sognnaes, R. F., editor. Washington, D. C., American Association for the Advancement of Science, 1955.

12. Kite, O. W.; Shaw, J. H., and Sognnaes, R. F. The prevention of experimental tooth decay by tube-feeding. J. Nutrition 42:89 Sept. 1950.

13. McClure, F. J., and Hewitt, W. L. Relation of penicillin to induced rat dental caries and oral L. acidophilus. J. D. Res. 25:441 Dec. 1946.

14. Hunt, H. R.; Hoppert, C. A., and Erwin, W. G. Inheritance of susceptibility to caries in albino rats (Mus Norvegicus). J. D. Res. 23:385 Oct. 1944.

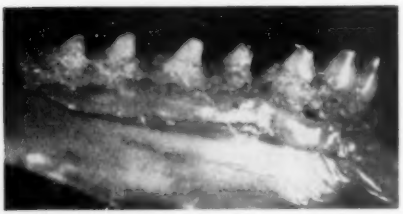

Fig. 1 • Lingual aspect of left mandibular molars of hamster fed a high carbohydrate diet. White gingival debris is plaque consisting in large part of acid-producing microorganisms, comparable to materia alba seen in mouths of human beings

considerably with age (and in some animals, with sex) has led some investigators to believe that endocrine factors may play a role in caries susceptibility;[15] however, the clinical importance of such a theory has not been clearly delineated.

Other factors such as salivary flow and quality, chemical constituents of the dental tissues (best illustrated by the elevated fluoride content of insusceptible teeth when compared to susceptible teeth) hypoplastic or malformed teeth, prenatal and preformative diet and so forth, all may have some influence on caries susceptibility; but as stated previously, it appears that as yet they must remain in the background behind the more obvious local factors—bacteria and carbohydrate.

SEQUENCE OF EVENTS IN PRODUCTION OF CARIES

The sequence of events in the mechanism of dental caries shall be considered briefly. The plaque accumulates on protected tooth surfaces. Usually the plaque is invisible, but when it is grossly apparent, it is referred to as *materia alba*. Figure 1 shows such an accumulation around the mandibular molar teeth of a hamster. With the periodic production of the attacking agent (depending on the frequency of ingestion of the substrate),[16] penetration of the process along the direction of the enamel rods occurs, which gives the cone-shaped penetration picture in the smooth surface lesions and the inverted cone formation at the base of occlusal pits and fissures. As the process reaches the dentinoenamel junction, the bacteria and their products spread slightly across this surface and then penetrate toward the pulp in the direction of the affected dentinal tubules. The end product, carious lesions, are illustrated in Figure 2, in which the disintegration of the maxillary molars of a hamster is shown.

The physiological defense reactions to this invasive process may be demonstrated microscopically in the dentin and

15. Shafer, W. G., and Muhler, J. C. Endocrine factors in experimental animal caries. In Advances in experimental caries research, Sognnaes, R. F., editor. Washington, D. C., American Association for the Advancement of Science, 1955.

16. Bibby, B. G. Effect of sugar content of foodstuffs on their caries-producing potentialities. J.A.D.A. 51:293 Sept. 1955.

Fig. 2 • Occlusal view of maxillary molars of hamster. Second and third molars have been partially destroyed by caries induced by the feeding of high carbohydrate diet

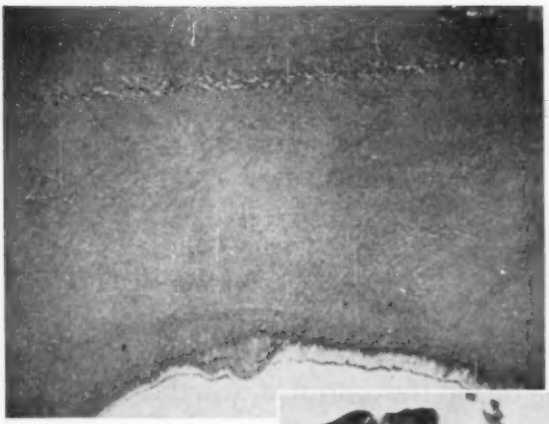

Fig. 3 • Left: Low-power view of decalcified section of tooth with small cervical carious lesion of 50 year old man. Note bulge of secondary (irregular) dentin at pulpal end of affected dentinal tubules

Right: Higher power view of lesion seen above. Dark staining dentinal tubules have been altered by carious process which is invading pulpally along tubules

pulp. A layer of transparent or sclerotic dentin develops immediately beneath the lesion. This is presumed to be hypercalcified through the deposition of inorganic salts from the pulp, transmitted along the affected dentinal tubules. This dentinal change can be demonstrated best by the use of ground sections, as illustrated in the standard textbooks on the subject.[17] Another reaction of the pulp and dentin is the protective odontoblastic deposition of irregular secondary dentin (Fig. 3) at the pulpal end of the affected tubules. This protective insulation of the pulp also occurs as the result of damage to intact dentin as in abrasion, erosion, fracture and cavity preparation.

COMMENT

The formula cited earlier can be reconsidered. Since this process represents a chain of events, it would seem that if any link in the chain were broken, the cooperative enterprise called the caries process should be interrupted. Thus, antibac-

17. Boyle, P. E., editor. Kronfeld's histopathology of the teeth, ed. 4. Philadelphia, Lea & Febiger, 1955, p. 138.

terial substances such as the antibiotics, or antibacterial technics such as toothbrushing, should and do affect this process. However, the antienzymatic materials and the substrate, sugar, will be discussed in other papers. Neutralization of acids within the plaque may be effective. And lastly, any agent or technic which will increase the resistance of the tooth should be beneficial. The most promising factor in this respect, fluorides, will be discussed in another article in the symposium.

Role of diet in the control of dental caries

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In a series of studies conducted by Bunting, Hadley, (nee Palmerlee), Crowley, Koehne, Morrell, Hubbell, White, and Jay[1-6] it was reported that a diagnostic relationship exists between dental caries activity and the number of lactobacilli demonstrable in saliva, and that a positive relation exists between the amount of carbohydrate in the diet and the extent of dental caries activity in human beings.

These observations have stimulated a great deal of controversy during the past 30 years, but they have withstood the test of time extremely well. With the exception of the remarkable effect of fluoride intake on caries onset, they have provided the method most generally used for the dietary control of dental caries.

A great many studies have been reported in recent years on the etiology of dental caries in rats and hamsters, but it is of interest that no studies have been reported which indicate that dental caries can be experimentally produced in these animals by the use of diets which do not contain a considerable amount of carbohydrate.

REVIEW OF LITERATURE

With respect to caries in small laboratory animals, there have been a few outstanding findings. Hoppert, Webber, and Canniff[7] (H.W.C.) observed that active

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1. Bunting, R. W., and Palmerlee, F. The role of Bacillus acidophilus in dental caries. J.A.D.A. 12:381 April 1925.

2. Hadley, F. P. A quantitative method for estimating Bacillus acidophilus in saliva. J. D. Res. 13:415 Oct. 1933.

3. Jay, P.; Crowley, M., and Bunting, R. W. Preliminary studies on the immunology of dental caries. J.A.D.A. 19:265 Feb. 1932.

4. Koehne, M.; Bunting, R. W., and Morrell, E. Control of dental caries in children. Am. J. Dis. Children 48:6 July 1934.

5. Hubbell, R. B., and Koehne, M. Effect of varying sugar intake on nitrogen, calcium, and phosphorous retention in children. Am. J. Dis. Children 47:988 May 1934.

6. White, J., and Bunting, R. W. An investigation into the possible relationship of ammonia in the saliva to dental caries. J.A.D.A. 22:468 March 1935.

7. Hoppert, C. A.; Webber, P. A., and Canniff, T. L. The production of dental caries in rats fed an adequate diet. J. D. Res. 12:161 Feb. 1932.

caries can be induced readily in rats by the use of diets made up chiefly of alfalfa, milk powder, salt, and coarsely ground corn. The same diet with finely ground corn failed to produce caries. Later, Hunt, Hoppert, and Erwin[8] reported a genetic factor which enabled them to develop a strain of rats that are highly resistant to dental caries when placed on the coarsely ground corn diet.

McClure[9] reported that caries could be produced in rats on high sugar diets which contained no coarse particles. More recently, studies by McClure[10] indicated that caries could be obtained in rats on diets which contained heat-processed cereal and as little as 18 per cent sugar. Miller[11] and others observed that caries activity in rats could be significantly reduced by the inclusion of fluoride in diets that were otherwise cariogenic.

Arnold[12] reported that caries was produced in hamsters on both the coarse and fine HWC diets, and that gingival caries was also observed, particularly in those animals on the fine diet. Many investigators reported the inhibition of hamster caries when the diets included fluoride, and conversely an increase in caries activity when sugar was added.

Experimental results cannot be repeated with mathematical certainty in either hamsters or rats. The fact that susceptible strains of hamsters will suddenly resist caries even though they are placed on HWC diets plus sugar cannot be explained easily.

The problems encountered in animal feeding studies are inconsequential, however, when compared with the countless difficulties incidental to human feeding experiments. It is for this reason that so few reports on experiments relative to the effect of diet on caries in human beings have appeared in recent years. It is not so difficult to supplement institutional diets with large amounts of sugar if the experimental and control subjects are separated geographically, but it is practically impossible to obtain adherence to restricted diets under the precise conditions required for experimental purposes, even though the diets meet the highest nutritional standards.

Our early studies in Michigan did not indicate that the absence of active dental caries was related to the nutritional adequacy of the diet. No indication was found that the use of dietary supplements brought about an arrest of caries activity. We did observe that low caries activity was associated with low sugar diets.

In 1936[13] we reported, when candy was made available, *ad libitum*, to a group of children with low caries activity who had been accustomed to low sugar diets, that within a few months their average lactobacillus counts increased, and evidence of beginning caries activity appeared. The candy was withdrawn immediately since it would have been reckless to continue. Although we reported that the conditions of this study were not ideal, the observations were sufficiently clear to prevent our attempting to demonstrate the cariogenic properties of sugar in human beings in the future.

Since then, in an excellent study by Gustafsson,[14] sugar was fed to a group of mental patients in the Vipeholm Hos-

8. Hunt, H. R.; Hoppert, C. A., and Erwin, W. G. Inheritance of susceptibility to caries in albino rats (mus norvegicus). J. D. Res. 23:385 Oct. 1944.

9. McClure, F. J. Observations on induced caries in rats. V. Effects of excessive sugar in the diet. J. D. Res. 24:239 Oct. 1945.

10. McClure, F. J. Dietary factors in experimental rat caries. In Advances in experimental caries research, Sognnaes, R. F., editor. Washington, D. C. American Association for the Advancement of Science, 1955.

11. Miller, B. F. Inhibition of experimental caries in the rat by fluoride and iodoacetic acid. Proc. Soc. Exper. Biol. & Med. 39:389 Nov. 1938.

12. Arnold, F. A., Jr. The production of carious lesions in the molar teeth of hamsters (C. auratus). Pub. Health Rep. 57:1599 Oct. 23, 1942.

13. Jay, P.; Hadley, F. P., and Bunting, R. W. Observations on relationship of Lactobacillus acidophilus to dental caries during experimental feeding of candy. J.A.D.A. 23:846 May 1936.

14. Gustafsson, B. E., and others. Vipeholm (Sweden) dental caries study. The effect of different levels of carbohydrate intake on caries activity in 436 individuals observed for five years. Acta Odont. Scandinavica 11:232 Sept. 1954.

pital, Sweden, and there was an increase in caries activity in the experimental group fed extra sugar between meals. This was in agreement with the findings in our candy study. Gustafsson reported further that caries was not significantly increased when sugar was taken at mealtime.

In the abstract preceding Boyd's[15] article, he states that caries activity was not significantly increased in 64 girls when low sugar diets were supplemented with 3 ounces of sucrose daily for six months. This abstract did not state whether the sugar was consumed as a liquid or solid or with or between meals. He also states that there was no relationship between the increased sugar intake and lactobacillus counts or between caries activity and lactobacillus counts.

The observations of Boyd have been consistently the reverse of the Michigan findings, although at one time he reported arrested caries in diabetic children whose diets contained no sugar. Boyd did not think that the absence of sugar was an important factor. Most investigators and the overwhelming majority of practicing dentists, nevertheless, agree that sugar is an important cariogenic dietary factor. It remains an interesting controversial point in a minor way. As an example of the differences in the interpretation of data by different investigators the views of Toverud,[16] Sognnaes,[17] and later Parfitt,[18] on published data concerning caries experience in Norway during and immediately after the second World War might be mentioned.

Toverud first reported that during the war years, when sugar was not obtainable, the caries rates in children declined sharply, and that they rose again when sugar became available after the war. Sognnaes and Toverud subsequently pointed out that although the caries activity had increased after the war, the increase was noticed first in the younger age groups, and that there was a time lag in the older children before caries increased. They interpreted this delay to mean that these children had acquired an immunity which protected them for some time, even after sugar was available. They attributed the protection to a nutritional factor present in the wartime diet. More recently, Parfitt of England reviewed these same data and calculated an increase in caries activity in all age groups with the return of sugar to the Norwegian diet.

Those who have been working with lactobacillus counts follow these discussions with interest, inasmuch as it has been observed that lactobacillus counts in a large percentage of patients can be reduced by the adherence to low carbohydrate diets, and that the counts remain low for a considerable time after sugar is reinstated.

It is not the purpose of this discussion to review all of the evidence that indicates that the behavior of lactobacillus counts reflects differences in the degree of caries activity. Suffice it to mention that most workers[19-25, 1, 2] have observed such a relation. Notable among the ex-

15. Boyd, J. D. Long term studies of dental caries progression among teenaged inmates of a custodial institution. J. California D. A. 26:30 May-June (supplement) 1950.

16. Toverud, G. Decrease in caries frequency in Norwegian children during World War II. J.A.D.A. 39:127 Aug. 1949.

17. Sognnaes, R. F. Further analysis of wartime caries observation. Brit. D. J. 87:291 Dec. 2, 1949.

18. Parfitt, G. J. The apparent delay between alterations in diet and change in caries incidence: a note on conditions in Norway reported by Toverud. Brit. D. J. 97:235 Nov. 2, 1954.

19. Kesel, R. J. Dental caries. Etiology, control and activity tests. J.A.D.A. 30:25 Jan. 1943.

20. Arnold, F. A., Jr., and McClure, F. J. A study of the relationship of oral Lactobacillus acidophilus and saliva chemistry to dental caries. Pub. Health Rep. 56:1495 July 25, 1941.

21. Becks, H.; Jensen, A. L., and Millarr, C. B. Rampant dental caries: prevention and prognosis; a five year clinical study. J.A.D.A. 31:1189 Sept. 1944.

22. Snyder, M. L. Correlation and comparison of laboratory findings with the clinical evidence of caries activity in a group of sixty-six children. J.A.D.A. 29: 2001 Nov. 1942.

23. Jay, P. The effect of substrate on the oral flora. J.A.D.A. 37:416 Oct. 1948.

24. Rosen, S., and others. Microbiologic differences in the oral cavities of the Hunt-Hoppert caries-resistant and caries-susceptible rats. J. D. Res. 34:113 Feb. 1955.

25. James, P. M. C., and Parfitt, G. J. An investigation into the relationship between salivary lactobacillus counts and caries experience. Brit. D. J. 97:83 Aug. 17, 1954.

ceptions were several reports by Boyd and his associates and by Glass.[26]

Jay and Arnold[27] have reported differences in the percentage distribution of high and low lactobacillus counts in fluoride and fluoride-free areas. We also observed a downward trend in the percentage of children with high counts and an increase in the number of negative cultures after fluoridation.[28] More recently Clapper, Downs and Heatherman[29] found more high counts in fluoride-free Boulder, Colo., than they did in Denver which has a water supply containing 1 ppm of fluoride, but they found the same percentage of negative cultures in both areas. They reported the relatively high value of 30 per cent for the negative cultures which was considerably higher than was found by Jay and Arnold in the many fluoride-free areas which they sampled.

No investigators have reported a reduction in the number of lactobacilli after the topical application of fluoride. This has been interpreted by some to mean that lactobacillus counts do not indicate the state of caries activity; on the other hand, it could very well indicate that the reduction in caries activity after the topical applications of fluoride is not of a sufficiently large magnitude to create a noticeable change in the oral flora.

This does not mean that the topical application of fluoride is not effective, but that it is perhaps less effective than is the fluoridation of domestic water or the restriction of sugar in the diet.

DISCUSSION

From the dentists' standpoint, there are these simple facts. First, there is a relation between sugar intake and caries activity and, second, there is an incontrovertible relation between sugar intake and the growth of lactobacilli. The patient, therefore, can reduce his caries activity by restricting his sugar intake, and the dentist is able to determine the effectiveness of his dietary recommendations with the help of lactobacillus counts.

The Medical Research Council of Great Britain has just published a special report[30] on the effect of sugar supplements on caries in children. This extensive report will not be reviewed here, but in essence it implies that there is no correlation between increased sugar intake and dental caries activity, nor is there a positive relation between the increased sugar intake and the lactobacillus counts or the Snyder test. It is of interest to note that the children in this study resided in London, Liverpool, and Sheffield, England. They were necessarily divided among several institutions which house children.

In the London study, the average sugar intake of those in the control group was reported as 11 ounces weekly as compared with 22¼ ounces of estimated sugar intake for those in the experimental group. In the Sheffield study the estimated sugar intake for the control group was 19½ ounces in the winter and 23½ ounces in the summer, and the estimated sugar intake for the experimental group was 41½ ounces in winter and 45½ ounces in the summer. In Sheffield they reported some evidence of increased caries activity in the molars of the older children, but in other instances they found less new caries activity in the sugar group than they did in the controls. The very fact that there was no change in the distribution of lactobacillus counts or posi-

26. Glass, R. L. Lack of correlation between salivary lactobacillus counts and dental caries activity. Oral Surg., Oral Med. & Oral Path. 5:210 Feb. 1952.

27. Jay, P., and Arnold, F. A., Jr. Epidemiological aspects of oral lactobacillus counts in fluoride and non-fluoride areas. In Dental caries and fluorine, F. R. Moulton, editor. Washington, D. C., American Association for the Advancement of Science, 1946, p. 111.

28. Jay, P., and Arnold, F. A., Jr. Unpublished findings.

29. Clapper, W. E.; Downs, R. A., and Heatherman, M. E. The relation of caries activity to lactobacillus counts and types and to the fluoride content of drinking water. J. D. Res. 32:27 Feb. 1953.

30. King, J. D., and others. Effect of sugar supplements on dental caries in children. Medical Research Council, special report series no. 288. London, Her Majesty's Stationery Office, 1955.

tive Snyder tests during the course of this study indicates that there could not have been a very great difference in the total sugar intake of the control and experimental subjects.

The Snyder test[31] is a colorimetric culture method designed for use in the dental office. In this test, a tube of agar is inoculated with freshly obtained saliva and incubated at 37½°C. Readings are taken at 24 hour intervals. If green is no longer the predominant color within 24 hours, the caries activity is considered high. Moderate to low activity is associated with a delay in the color change throughout a four day period. If no color change has taken place after the third day, the saliva is considered to be inactive. The Snyder test is an excellent method of screening patients for dietary treatment, but, in our experience, it has not been sufficiently sensitive to recognize trends in patients undergoing dietary treatment.

It is generally accepted that lactobacillus counts can be reduced by the strict adherence to low carbohydrate diets. I reported in 1947[32] that it is possible to maintain a low lactobacillus level for a considerable length of time by restricting carbohydrates periodically. This is accomplished by following consecutively, three dietary plans.[33]

Plan I provides essential nutrients and sufficient calories, but the carbohydrate is restricted to 100 Gm. daily and it contains no sugar. After two weeks the patient progresses to Plan II in which carbohydrate other than sugar is no longer restricted. Lactobacillus counts are determined after each two week period. The count is invariably low after Diet Plan I, and if it continues so after Diet Plan II, the patient adopts Plan III which allows all carbohydrates including sugar with one of the meals each day. Plan III may be comparable to the Vipeholm diet in which sugar was increased at mealtime. Gustafsson[14] reported in his study that there was no significant increase in caries when sugar was consumed in this manner, and we find that about 70 per cent of our patients have low lactobacillus counts while they are on Plan III. It has been our experience, however, that Plan III is not associated with low lactobacillus counts unless it is preceded by Plans I and II.

If sugar, when eaten at one meal a day, does not cause an increase in the lactobacillus count, the patient may return to a diet in which sugar is no longer restricted. Theoretically, the situation is one in which the lactobacillus count is low while the patient is enjoying the same diet that was formerly associated with high lactobacillus counts and high caries activity. This favorable condition usually persists for about six months and in many instances longer. Why the lactobacillus count does not return to the high level usually associated with a high sugar intake has not been determined. It would seem that the very rapid reduction in the number of oral lactobacilli had made possible the establishment of a flora not favorable to the initiation of rapid lactobacillus proliferation. Since this observation was reported in 1947 (Table 1), the method has been adopted by various dental caries control laboratories and state health departments with varying degrees of success. There have been few publications, however, reporting these results. Kitchin and Permar[34] reported the results of an eight year study on the effectiveness of this procedure in the School of Dentistry at Ohio State University, and their results closely paralleled those obtained by us in 1947 (Table 2).

31. Snyder, M. L. A simple colorimetric method for the estimation of relative numbers of lactobacilli in the saliva. J. D. Res. 19:349 Aug. 1940.

32. Jay, P. Reduction of oral lactobacillus counts by the periodic restriction of carbohydrates. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 33:162 March 1947.

33. Jay, P., and others. Dietary program for the control of dental caries. Ann Arbor, Mich., Overbeck, 1955.

34. Kitchin, P. C., and Permar, D. Results of an eight-year study of the effectiveness of carbohydrate restriction in reducing salivary lactobacillus counts. J. D. Res. 34:89 Feb. 1955.

Table 1 • The relation of Lactobacillus acidophilus counts to carbohydrates in the diet of patients studied in 1947

No. of patients	Diet plan	Number of patients with reduced counts*	Percentage	Number of patients with increased counts	Percentage
809	Started I	675	83.4	...	...
563	Continued on II	459	81.6	104	18.4
313	Continued on III	230	73.4	83	26.5
127	Continued on IV	103	81.2	24	18.8

Plan I Approximately 100 gm. of carbohydrate daily
Plan II Plan I plus starch
Plan III Plan II plus sugar at one meal
Plan IV Unrestricted

* A count is considered reduced if it is 85 per cent lower than the original or, in the case of counts which were originally only moderately high (10,000-50,000), if has been reduced to less than 10,000.

In order to demonstrate the reproducibility of these observations, the results obtained with an additional 350 patients who received dietary instruction from one of the authors (A.B.) are included (Table 3). The results reported heretofore have represented the findings after several hundred patients had received instruction from a number of dentists in different parts of the country. It will be seen that these more recent results are similar to those obtained by us previously and, more recently, by Kitchin and Permar. It is particularly interesting that the number of patients who failed to follow through is very similar in the three experiences described. It is possible, therefore, to predicate the percentage of patients in a dental practice to which this procedure is applicable.

Table 4 lists in detail the change in lactobacillus counts of the 350 patients who were interviewed. After Diet Plan I the counts of 88 or 25.3 per cent were reduced to zero. After Diet Plan II, 67 or 27.8 per cent had counts of zero. Five or 8.6 per cent remained higher than 10,000, and so on.

Table 2 • Effect of dietary treatment on the salivary lactobacillus counts of patients treated through the dental caries control laboratory of Ohio State University. (The figures in parentheses are those published by Jay[1] for the Michigan Laboratory)

	Total number	Patients with low lactobacillus counts		Patients with high lactobacillus counts		Patients who had high lactobacillus counts which were later reduced to low counts for a period of 6 months or more
		Number	Per cent	Number	Per cent	
Total number of individuals examined	1,089	278	26	811	74	
Low counts which later became high	101					
High counts: Dietary treatment undertaken, Plan I supposedly followed for at least 2 wk.	531	410	77(83.4)	121	23	
After completion of Plan II	376	318	85(81.6)	58	15	1
After completion of Plan III	306	225	74(73.4)	81	26	2
After completion of at least 2 wk. on Plan IV (unrestricted diet)	202	142	70(81.2)	60	30	5
Checked after 6 mo. on Plan IV	126	91	72	35	28	14
Checked after 1 yr. on Plan IV	75	53	71	22	29	10
Checked after 2 yr. on Plan IV	34	25	74	9	26	3
Checked after 3 or more yr. on Plan IV	23	14	61	9	39	2

Table 3 • The relation of lactobacillus counts to carbohydrates in the diet of patients studied in 1954-55

No. of patients	Diet plan	No. of patients with reduced counts*	Per-centage
350	I	302	86.7
299	II	233	78.0
167	III	149	89.2
73	IV	65	90.0

Plan I 100 Gm. of carbohydrate daily (no sugar)
Plan II Plan I plus starch
Plan III Plan II plus sugar with one meal
Plan IV Unrestricted

* A count is considered reduced if it is 85 per cent lower than the original or, in the case of counts which were originally only moderately high (10,000-50,000), it has been reduced to less than 10,000.

Of the 350 patients who began the dietary program, only 73 submitted saliva specimens after Diet Plan IV. It has been found that most of the patients who fail to submit specimens do so because, after the initial success of Diet Plans I and II, they are resolved not to reacquire the habit of eating highly sweetened substances. Usually they request saliva cultures at some future time in anticipation of a visit to the dentist.

Any discussion of the dietary control of dental caries must include the role of fluorides (F.). It has been demonstrated conclusively that the use of domestic water containing 1 ppm fluoride will reduce the prevalence of caries greatly if the water is used during the first eight years of life. It has been calculated that in temperate climates, for persons in the first to the eighth year of life, this will provide approximately 0.5 to 1 mg. of fluoride (F.) daily in addition to that ordinarily available in food.[85] Fluoride

Table 4 • The relation of lactobacillus counts to variations in carbohydrate content of the diet

Lactobacillus count (Range)	Initial count		After Diet Plan I		After Diet Plan II								After Diet Plan III		After Diet Plan IV	
					Reduced to less than 10,000		Remained higher than 10,000		Total after Plan II		Repeat of Plan II					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0			88	25.3	67	27.8	5	8.6	72	24.0	4	5.3	53	31.7	23	31.5
Under 1,000			65	18.7	40	16.6	4	6.9	44	14.8	8	10.7	36	21.5	13	17.8
1,000–2,500			30	8.6	29	12.0	5	8.6	34	11.4	4	5.3	9	5.4	7	9.6
2,600–4,400			21	6.0	10	4.2	4	6.9	14	4.7	3	4.0	9	5.4	8	11.0
4,500–6,400			31	8.9	9	3.7	3	5.2	12	4.0	3	4.0	8	4.8	3	4.1
6,500–8,400			15	4.3	7	2.9	1	1.7	8	2.7	3	4.0	11	6.6	2	2.7
1,500–10,000	6	1.7	19	5.5	11	4.6	3	5.2	14	4.7	1	1.3	4	2.4	5	6.8
17,000–17,400	27	7.7	11	3.2	14	5.8	5	8.6	19	6.4	4	5.3	11	6.6	5	6.8
18,500–24,000	11	3.1	12	3.4	10	4.2	1	1.7	11	3.7	2	2.7	5	3.0	3	4.1
25,000–34,000	35	10.0	13	3.7	12	5.0	6	10.3	18	6.0	11	14.6	8	4.8	1	1.4
35,000–44,000	22	6.3	5	1.4	7	2.9	1	1.7	8	2.7	5	6.7	3	1.8	1	1.4
45,000–64,000	39	11.1	10	2.9	8	3.3	4	6.9	12	4.0	9	12.0	4	2.4	2	2.7
65,000–84,000	25	7.1	9	2.6	4	1.7	5	8.6	9	3.0	4	5.3	6	3.6		
85,000–114,000	19	5.4	4	1.5	2	.8	3	5.2	5	1.7	2	2.7				
115,000–134,000	19	5.4	1	.3	4	1.7	1	1.7	5	1.7		0				
135,000–164,000	12	3.4	5	1.4	1	.4	1	1.7	2	.7	2	2.7				
165,000–184,000	13	3.7	2	.6	1	.4	1	1.7	2	.7	1	1.3				
185,000–249,000	29	8.3	3	.9	3	1.2	2	3.4	5	1.7	4	5.3				
250,000–399,000	36	10.3	2	.6	1	.4	1	1.7	2	.7	3	4.0				
400,000–649,000	36	10.3	2	.6	1	.4	2	3.4	3	1.0	2	2.7				
650,000–849,000	9	2.6														
850,000–1,000,000	12	3.4														
Total	350		348		241		58		299		75		167		73	
0–10,000		1.7		77.3		71.8		43.1		66.3		34.6		77.8		83.5
11,000–114,000		50.7		18.7		23.7		43.0		27.5		49.3		22.2		16.4
Over 114,000		47.4		4.4		4.5		13.6		6.5		16.0				

(F.) is, therefore, an important dietary factor for the prevention of dental caries.

SUMMARY

Additional data demonstrate that in caries-susceptible individuals, oral lactobacillus counts are considerably reduced when the daily carbohydrate intake is sharply curtailed. After dietary treatment, the carbohydrate content of the diet may be increased to its original level but the lactobacillus counts will remain low in the majority of individuals.

Gross changes in individual caries incidence and differences in communal caries prevalence are associated with changes in lactobacillus counts.

The lactobacillus count or the Snyder test is a fair indication of carbohydrate consumption. It has been amply demonstrated that in human feeding studies in which one group of individuals is supposed to be consuming more carbohydrate than another, the lactobacillus counts in the carbohydrate group should increase if sufficient carbohydrate is added to reveal increased caries activity in a short time.

There was no change in the lactobacillus counts or the Snyder test in the study reported by King, Mellanby, Stones and Green, which is an indication that the investigators had not ascertained the exact sugar consumption of their experimental subjects. This is not surprising under the conditions of their study, particularly with the older individuals, if British children are similar to normal youngsters living in the United States.

Fluoride (F), ingested during the tooth development period, and sugar as well as other carbohydrate, in some individuals, are the only dietary factors that have thus far been satisfactorily demonstrated to be related to caries activity in human beings.

35 McClure, F. J. Ingestion of fluoride and dental caries. Quantitative relations based on food and water requirements of children one to twelve years old. Am. J. Dis. Children 66:362 Oct. 1943.

Language • The discovery of the logical structure of language was as much a scientific discovery as, for example, the discovery of the anatomical structure of the body. The systematic organization of language, its transformation from an instinctive and unconscious tool into one of increasing precision, was one of the most important preliminary tasks which were required for the development and transmission of knowledge. *George Sarton, Introduction to the History of Science, vol. 1, p. 7.*

Diagnosis of facets in occlusal equilibration

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The problem of occlusal equilibration can be unnecessarily complex if crossbite or malpositioned teeth are mixed in their relations to normally positioned teeth in the same arch. In the study and correction of trauma, many aids have been suggested such as intraoral wax bites, articulating paper, palpation, the patient's tactile sense, intraoral roentgenograms, correlation of mobility and gingival condition, as well as study models. In order to treat occlusal trauma properly, a combination of these diagnostic aids will help to locate this contributing factor in tissue loss.

The object of this paper is to present a method for the analysis and use of study models in occlusal equilibration. With accurate reproduction of the anatomy of each tooth, a simple method of analysis and color marking may be used to outline the whole process of equilibration before the actual oral work is initiated. The study of the model can follow the same steps as is followed in the procedure for equilibration in the mouth—preliminary grinding, centric and protrusive excursions on the working and balancing side. Properly mounted models on an adjustable articulator simplify analysis and correction.

PRELIMINARY GRINDING

Any system for color marking will help to differentiate the premature contacts in the various functional positions so that the models do not become a maze of similar markings. Arbitrarily, plain black pencil marking is suggested herein for areas that are to be corrected in the preliminary grinding stage. Incisal edges or cusps which are elevated beyond the plane of occlusion are marked to indicate the desired shortening. Unequal marginal ridges that are predisposed to food impaction are marked with black on the high marginal ridge to be reduced. Plunger cusps are marked with an arrow on the appropriate buccal or lingual surface (Fig. 1). If abnormally worn teeth are present, the desired reduction of the buccolingual width can be planned by marking the area to be reshaped.

Any esthetic requirement such as rounding sharp angles may also be indicated at this time.

Facets of wear will be discussed in relation to eccentric positions, although the facet surface that should function as a rounded surface against a flat plane is corrected during preliminary grinding.[1]

PREMATURE CONTACTS IN CENTRIC RELATION

Premature contacts when the teeth are in centric relation are difficult to locate on the study casts, but small rounded

Illustrations by author.

1. Miller, S. C. Textbook of periodontia. ed. 3. Philadelphia, Blakiston Co., 1950, p. 343-384.

areas may be seen in the fossae or on the cusp heights; these areas indicate premature contacts. They may be marked by a black circle rather than by a solid area as in preliminary grinding.

PROTRUSIVE MOVEMENTS OF MANDIBLE

Protrusive movements of the mandible are guided by the anteroposterior incline of the glenoid fossa (condylar path) and the anterior tooth guidance.[2] The protrusive position can be considered before protrusive excursion. Usually the marking made by teeth that are elevated and by discrepancies in the occlusal plane are indicated on the models as part of the preliminary grinding phase. Marking in solid black of the offending tooth length is done on both arches.

Facets are commonly found on the lingual marginal ridges of the anterior maxillary teeth; these facets usually indicate disharmony of the protrusive guiding inclines. In some instances, they are also indicative of trauma in lateral eccentric movements. Outlining these areas in green will help to show their extent and relation so that the area for occlusal grinding in the mouth will be easier to locate, and the approximate amount of tooth structure to be removed can be evaluated properly.

The location of facets on the anterior teeth and the excursion in which they are created depend to a great extent on the relation of the overbite to overjet. If there is an edge to edge bite, incisal wear can be caused by lateral as well as by protrusive movements. Articulated models will help to give the answer; such answer can be confirmed by oral examination.

Wear on the lingual surface of the upper anterior teeth usually indicates trauma in protrusive movements if it is parallel to the general mesiodistal line of the anterior teeth from the occlusal view.

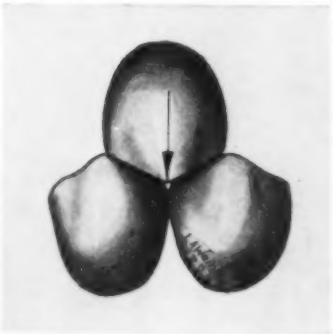

Fig. 1 • Plunger cusps marked with arrow

The greater the horizontal overjet, the more will facets indicate trauma in protrusive movements; as the horizontal overjet decreases it is easier for contact to occur in lateral excursions.

If the planes of the facets on the upper lingual surfaces are at an angle to the mesiodistal line of the anterior teeth from the occlusal view, interference in lateral excursions may be suspected. The amount of overjet, overbite, the incisal guidance, and the horizontal rotation of the mandible during the Bennett movement are factors that influence the angle of the facets.

Figure 2 shows the harmonious inclines of the incisal guidance and condylar path (N) with an acute interfering incline of a posterior tooth (A). When present, these interfering posterior inclines usually are located on the distal inclines of the upper cusps and the mesial inclines of the lower cusps contacting them.

As the mandible protrudes (Fig. 3), the acute incline can prevent anterior contact and cause stretching of the condylar musculature.[2] The plane of the facet on such an interfering cusp incline

2. Schuyler, C. H. Correction of occlusal disharmony of the natural dentition. New York D.J. 13:445 Oct. 1947.

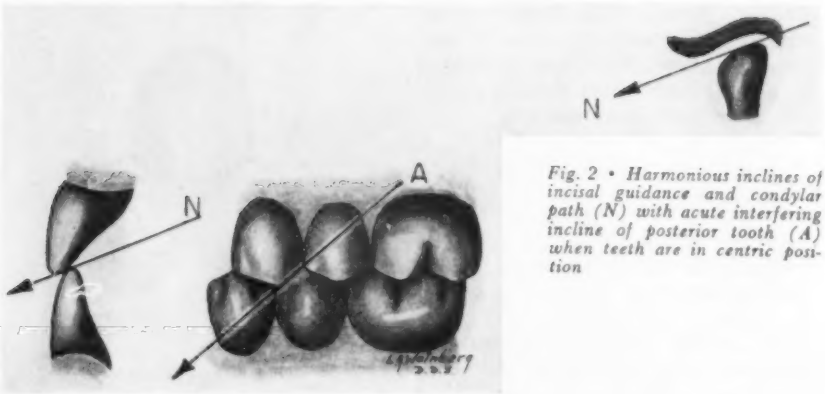

Fig. 2 • Harmonious inclines of incisal guidance and condylar path (N) with acute interfering incline of posterior tooth (A) when teeth are in centric position

usually is perpendicular to the mesiodistal line of the arch from the occlusal view, and can be marked with green outline for correction during the protrusive excursion phase. This facet also would be at an angle to the long axis of the tooth from the buccal view (Fig. 2, 3). If the trauma continues over a long period, the angle of the facet will be proportional to its distance from one of the extreme guiding factors of the protrusive excursion—namely, the incisal guidance or the condylar path.

Fig. 4,A, shows an upper bicuspid with facet 1 on the distal incline of the buccal cusp and facet 2 on the marginal ridge where a cusp of the lower distal tooth became elevated either through development or a poor restoration (Fig. 4,B). This condition occurs frequently when missing teeth have not been replaced and teeth of the opposite arch move into the space. As protrusive excursions take place, considerable trauma can occur to the teeth involved, and there may also be temporomandibular joint injury.[2]

Many times when the interfering surfaces causing the facet are at an angle to the mesiodistal line of the arch rather than perpendicular to it from the occlusal view, they can cause deviations to the left or right as the jaw slides forward in protrusive excursion. These interfering surfaces can be located on the lingual slope of the upper tooth (Fig. 4,C) or the buccal slope of the lower tooth (Fig. 4,D), as well as on the cusp inclines. It is important to note that these surfaces play a major part in lateral eccentric movements. Their influence on protrusive excursion will be discussed later in the paper. If the models are mounted correctly and accurate eccentric records are made, many times by simple movements of the articulator in protrusive as well as in lateral excursions, the interfering inclines can be seen clearly in one or the other movement as the case may be and they can be marked in the appropriate color.

LATERAL EXCURSIONS

Facet Location in Lateral Function • In addition to the areas of facet location previously discussed, Figure 5 shows some of the general locations where wear occurs if there is disharmony in lateral excursions on both the working and balancing sides. These facets would be on three general surfaces. The facet marked 3 in Figure 5,A, is on the lower

lingual cusp incline; the one marked 2 is on the lower buccal cusp incline, and 1 is on the buccal surface of the lower buccal cusp, or what shall be called the lower buccal slope. It should be noted that two of the facets, 1 and 3, are generally parallel to each other from the proximal view (Fig. 5,B); the significance of this will be seen later.

The general location of facets caused by disharmonies in lateral excursions on the upper teeth on the working and balancing sides is shown in Figure 5,C. On the upper posterior teeth, as on the lower, occlusal disharmonies in lateral eccentric function can produce three general areas of facet location. As seen in Figure 5,C, facet 1 is on the upper buccal cusp incline, facet 2 is on the upper lingual cusp incline, and facet 3 is on the upper lingual slope. Here, too, it should be noted that facets 1 and 3 are generally parallel to one another (Fig. 5,D).

Significance of Facet Location • The fact that two of the three possible locations of facets on both upper and lower posterior teeth are generally parallel to one another makes it easy to tell in which excursion the trauma exists. It can be seen in Figure 6, left, on the working side, that the upper buccal cusp incline, area 1, and the upper lingual slope, area 3, receive functional contact. These surfaces generally are parallel with each other, therefore the parallel facets are related to the working side. When that same upper tooth functions as the balancing side, as seen in Figure 6, right, only the upper lingual cusp incline contacts the lower tooth (area 2); therefore, the facet "opposite" the parallel facets is caused by the balancing excursion.

The lower molar teeth can be classified in the same manner. Figure 7, left, shows the right molars on the working side; here the facets that are parallel also are caused by working eccentric movements, as in the upper teeth. The lower buccal slope and the lower lingual cusp incline, areas 1 and 3, contact the upper tooth when functioning as the working side. The lower buccal cusp incline is the only part of the lower tooth that has contact with the upper when functioning as the balancing side (area 2, Fig. 7, right).

The "law of parallelism," as applied in this sense, is that wear facets can occur

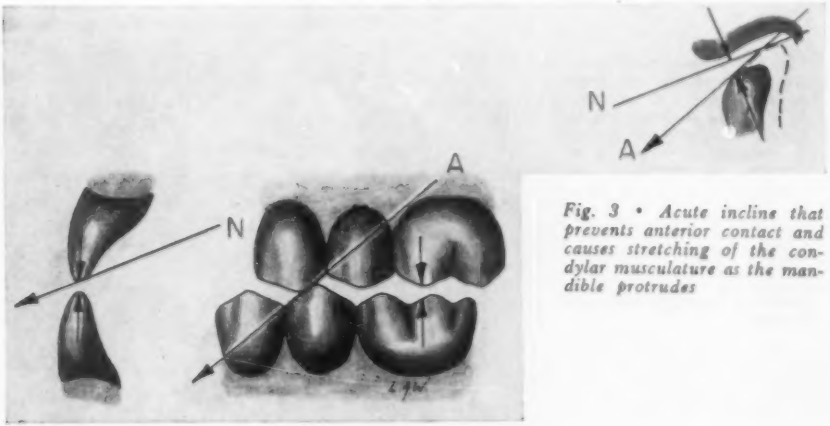

Fig. 3 • Acute incline that prevents anterior contact and causes stretching of the condylar musculature as the mandible protrudes

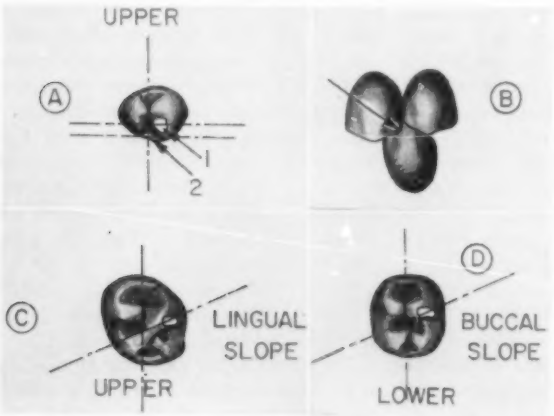

Fig. 4 • A: Facets on distal incline of buccal cusp of upper bicuspid. B: Cusp of lower distal tooth that became elevated. C: Interfering surface on lingual slope of upper tooth. D: Interfering surface on buccal slope of lower tooth

in three general locations on both upper and lower posterior teeth when they are functioning in lateral eccentric movements. The two facets that generally are parallel on a tooth are formed by disharmony when functioning as the working side. The other occlusal facet is caused by disharmony when functioning as the balancing side.

Working Side • The facets on the upper teeth that indicate trauma when functioning as the working side may now be marked in red outline. The "law of parallelism" in this sense is followed, and any facets on the upper buccal cusp inclines as well as on the upper lingual slopes are properly marked. Periodic examination of the models in centric position helps to locate exactly how this facet was created, and the corresponding facets on the lower teeth are marked.

For maximum efficiency and reduced strain, the proper functional occlusal relationship is that of a rounded surface of a cusp functioning against a smooth har-

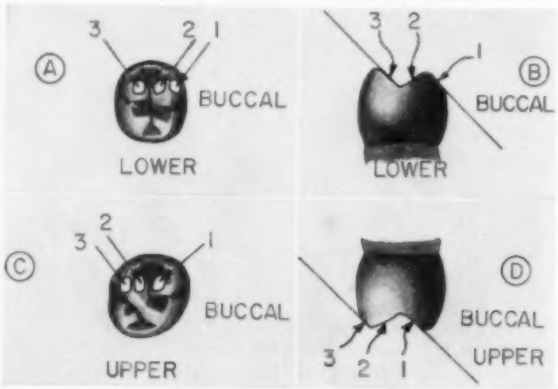

Fig. 5 • Locations of wear. A: Facet 1 is on lower buccal slope; 2 is on lower buccal cusp incline; 3 is on lower lingual cusp incline. B: Note facets 1 and 3 are generally parallel with each other from proximal view; C: facet 1 is on upper buccal cusp incline; 2 is on upper lingual cusp incline; 3 is on upper lingual slope; D: Note facets 1 and 3 are generally parallel with one another

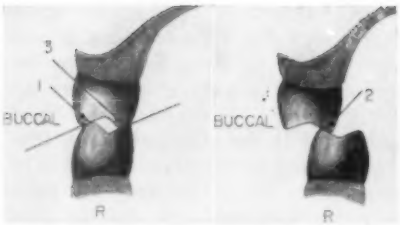

Fig. 6 • Left: Area 1, upper buccal cusp incline and area 3, upper lingual slope on working side, receive functional contact and are parallel to each other. Right: When same side functions as balancing side, area 2, upper lingual cusp incline contacts lower tooth

monious incline plane.[2] The facet formation itself indicates that this condition does not exist. One of the "parallel" facets on each tooth should function as a guiding incline and the other as a rounded surface. The upper buccal cusp incline and the lower lingual cusp incline function as the guiding inclines, and the upper lingual slope and the lower buccal slope should function as the rounded surface. Figure 8 shows the upper lingual slope rounded without eliminating centric contact (A) or the height of the cusp (B).[3,4]

Balancing Side • Any facet on the upper lingual cusp incline (facet 2, Fig. 6, right) and the corresponding lower buccal cusp incline (facet 2, Fig. 7, right) may be outlined in blue. These surfaces are not usually used for mastication of the bolus, so they can be two guiding planes in contact and in harmony with the other guiding inclines of the teeth on the balancing side as well as on the working side.

LATERAL DEVIATION IN PROTRUSIVE EXCURSION

Working Side Facets • Previously the facets on the buccal or lingual slopes and on the cusp inclines were described as one area in relation to the working and balancing sides. Close examination of any slope, however, reveals that there are actually three possible areas for facet formation. In Figure 9,A, a lower bicuspid is shown with a facet mesial to the midline of the buccal slope, a facet distal to the midline and one at the midline or height of contour of the slope.

Because of the natural curvature of the lower buccal slopes or upper lingual slopes and the articulation of the teeth, the mesial and distal facets seen in the occlusal view (Fig. 9,B) will be at an angle to the mesiodistal line of the arch. The facet on the midline of the slope will be perpendicular to the mesiodistal line of the arch. The buccal slope of the lower molars and the lingual slope of the upper molars would have the same three general facet possibilities for the slope of each cusp because of the contour created by the buccal and lingual grooves.

The same general scheme holds true for facets on the working side on the lower lingual cusp inclines as seen in Figure 9,C. For reasons of simplicity,

3. Sorrin, S. Traumatic occlusion: its detection and correction. D. Digest 40:170 May; 40:202 June 1934.

4. Weinberg, L. A. Visualized technique of occlusal equilibration. J. D. Med. 7:9 Jan. 1952.

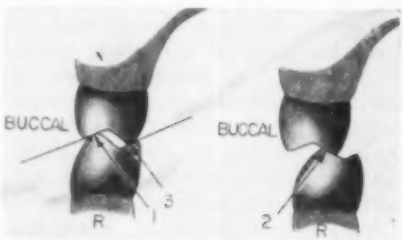

Fig. 7 • Left: Lower molars on the working side. Facets are parallel. Right: Same lower molars functioning as balancing side. Lower buccal cusp incline is only part of tooth in contact with upper

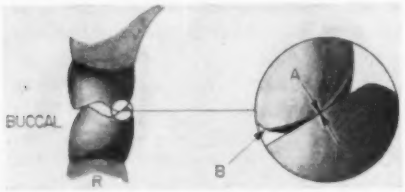

Fig. 8 • Showing upper lingual slope on working side rounded without eliminating centric contact (A) or height of cusp (B)

only one cusp, as in the bicuspid, is shown, but each cusp offers a height of contour in the midline and two inclines mesial and distal to it. When viewed occlusally, the mesial and distal inclines of the cusp are at an angle to the mesiodistal line of the arch, whereas the facet on the midline of the cusp incline, or height of contour, will be perpendicular to the arch line. For orientation purposes, the facets on the working side are shown in Figure 9,D.

To analyze these facets properly, they must be considered from the occlusal view as well as from the proximal view. All of the facets under discussion, if they are caused by the working side in lateral function, should be at an angle to the long axis of the individual tooth as seen in the proximal view in Figure 9,D. The angle in this plane depends on the condylar path, incisal guidance and the relative location of the tooth concerned between these two. If a tooth is tipped, the angle the facet makes with the long axis of the tooth may vary, but the angle of the facet to the plane of the occlusion should conform to the afore-mentioned.

A three-quarter view of the teeth and condyle is shown in Figure 10. Because of the Bennett movement, when this side is functioning as the working side, the condylar path can be considered as zero angulation. For illustrative purposes the incisal guidance of these natural teeth has been arbitrarily shown as 30 degrees. If the incisal guidance is 30 degrees and the condylar path is zero degree, then the midpoint will be the mathematical average of these two figures, namely, 15 degrees. The third molar may be the midpoint in this relationship, and a well worn facet may be expected to be 15 degrees; the point between the incisal angle and the third molar—say, the mesial cusp of the first molar—would be approximately 22 degrees.

Conclusion • The facets caused by the working side on the upper and lower teeth are found in three possible locations around each cusp incline and slope. From the occlusal view, facets mesial or distal to the midline of the individual cusp incline or slope are at an angle to the mesiodistal axis of the arch. The facet on the midline or height of contour will be perpendicular to the mesiodistal line of the arch. All of these facets will be at an angle to the long axis of the tooth itself when viewed proximally.

The angles in this plane depend on the relative location of the tooth between the condylar path and the incisal guidance. The individual angle of the facets

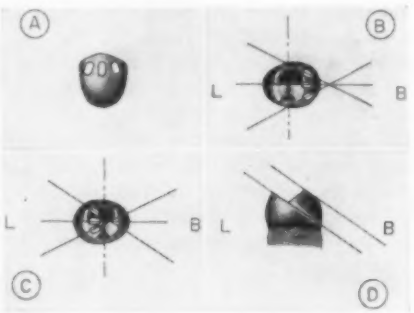

Fig. 9 • Lower bicuspid. A: Facet mesial to midline of buccal slope; facet distal to midline, and facet at midline. B: Occlusal view. C: Facets on lower lingual cusp inclines. D: Facets on working side

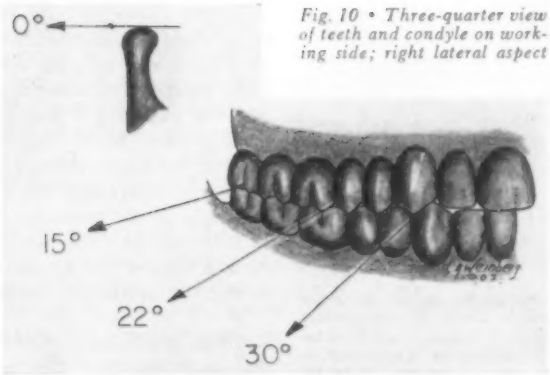

Fig. 10 • Three-quarter view of teeth and condyle on working side; right lateral aspect

to the mesiodistal line of the arch, viewed occlusally, depend on the surface on which the facet is located, the amount of overjet, angulation and articulation of the opposing tooth.

Balancing Side Facets • A facet on the lower buccal cusp incline and the upper lingual cusp incline may indicate trauma in the balancing excursion. As with the facet location on the working side guiding inclines, there are three possible locations for the facets on each cusp incline itself. On the lower molar shown in Figure 11, facets 1 and 3, mesial and distal respectively to the center of the cusp incline, are at an angle to the mesiodistal line of the arch. Facet 2 at the center of the cusp incline is perpendicular to the mesiodistal line of the arch. The same facet location is possible for the lower distobuccal cusp, but for purposes of clarity only the facets on the mesiobuccal cusp incline are shown.

The upper molar (Fig. 11) shows three possible facet areas on the mesiolingual cusp incline, any one of which would indicate lack of harmony in the balancing excursion. The distolingual cusp is not described for reasons of clarity. Again, facets 1 and 3 which are mesial and distal respectively to the center of the cusp incline are at an angle to the mesiodistal line of the arch, and facet 2 at the center of the cusp incline is perpendicular to the arch line.

In most instances, within range of the normal condylar path, the facets on the balancing side will be at an angle to the long axis of the tooth from the proximal view. The condyle slides out of the glenoid fossa on the balancing side which will arbitrarily be called 30 degrees. If the incisal guidance is 30 degrees, as before, then all the balancing facets will be approximately 30 degrees since the extreme guiding factors of the incisal guidance and the condylar path are both 30 degrees (Fig. 12) and are in the same line. The variations in each instance naturally change this angle, depending on the location of the tooth in relation to the different incisal and condylar paths.

Relation of Working Side Facets to Protrusive Deviation • The interfering posterior inclines that produce facets in the protrusive excursion and cause opening of the bite without lateral deviation were discussed previously. They were shown to be perpendicular to the mesiodistal line of the arch from the occlusal view (Fig. 4,A). These facets are similar to

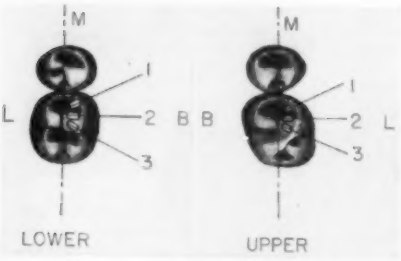

Fig. 11 • Lower and upper molars. In lower molar, facet 1 mesial to center of cusp incline; facet 2 at center of cusp incline; facet 3 distal to center of cusp incline. In upper molar, three possible facets on mesiolingual cusp incline are shown

the ones that indicate lateral deviation in that both are located on the mesial inclines of the lower cusps and the mesial curvature of the lower buccal slopes contacting the distal inclines of the upper cusps and the distal curvature of the upper lingual slopes. The chief difference lies in the fact that interfering inclines that cause lateral deviations in protrusive excursions are at an angle to the mesiodistal line of the arch from the occlusal view.

Figure 13 shows the inclines and slopes on the working side that can cause lateral deviation in protrusive excursion. The mesial inclines of both lower lingual cusp inclines and the mesial curvatures of both lower buccal slopes are at an angle to the mesiodistal line of the arch. Because of the anatomy of these particular surfaces, the facets all have a general anterior direction toward the lingual. Naturally, the corresponding distal inclines of both upper lingual cusp slopes have a similar pattern. The planes of these facets are all at an angle to the mesiodistal line of the arch from the occlusal view, and they all have the same direction anteriorly and lingually.

Conclusion • If trauma occurs to the working side cusp inclines or slopes in protrusive excursion, and the inclines are at an angle to the mesiodistal line of the arch from the occlusal view, the mandible will deviate toward the opposite side. For example, if trauma occurred to the distal incline of the buccal cusp incline of the upper right bicuspid in protrusive excursion and the incline was at an angle to the mesiodistal line of the arch, it would cause the mandible to deviate toward the opposite or left side during the protrusive movements.

Relation of Balancing Side Facets to Protrusive Deviation • The balancing side cusp inclines, the lingual of the upper and the buccal of the lower, can also cause lateral deviation in protrusive excursions. Figure 14 shows the mesial inclines of the lower buccal cusp inclines at an angle to the mesiodistal line of the arch. Because of the anatomy of the tooth surface, the general direction of these facets is anteriorly and buccally. The distal inclines of both upper lingual cusp inclines are at an angle to the mesiodistal line of the arch in the upper right molar (Fig. 14). Both of these facets from the occlusal view have an anterior and buccal direction.

Conclusion • If trauma occurs to the cusp inclines on the balancing side in protrusive excursion, and the inclines are at an angle to the mesiodistal line of the

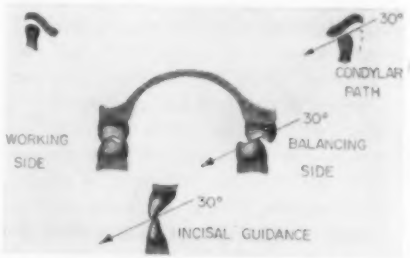

Fig. 12 • Incisal guidance with teeth in right lateral eccentric position

arch from the occlusal view, the mandible will deviate toward the same side. For example, if the distal incline of the lingual cusp incline of the upper right bicuspid suffers trauma in protrusive excursion (as well as being at an angle to the mesiodistal line of the arch) the mandible will deviate toward the same (right) side.

This lateral deviation cannot be outlined on the model before treatment because the inclines involved will look like premature contacts in lateral excursion unless the models are properly mounted and accurate records are made. If there is some doubt concerning the mounted models, however, and the patient's jaw deviates laterally when in protrusive excursion, it would not be possible to eliminate the deviation by grinding on the facet that is perpendicular to the mesiodistal line of the arch. If the patient's jaw deviates to the left, for instance, then the possibilities are limited to the balancing inclines on the left side or the working inclines on the right.

Examination of the model may give the answer immediately, or at least indicate a few probable areas of facets. The offending inclines may be located through the patient's tactile sense, through the use of articulating paper or through the use of many other clinical aids. Correction will result in harmonious excursions.

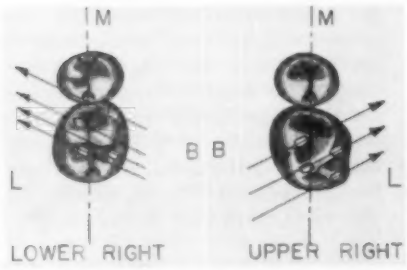

Fig. 13 • Inclines and slopes of cusps on working side that can cause lateral deviation in protrusive excursion

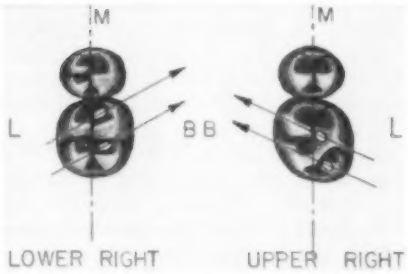

Fig. 14 • Cusp inclines on balancing side

Malpositioned Teeth • Malpositioned or rotated teeth follow the principles outlined herein because the factors of wear depend on the condylar path and incisal guidance and all the factors of the physiological movement of the mandible in all its excursions. The individual facet on the rotated or malpositioned tooth may still have the same angulation and orientation to the arch, but it naturally can be expected to have a different relation to the tooth itself. It is impossible to make fixed rules about the surfaces of an individual tooth in its relation to function because rotation or crossbite can change the whole picture, but the principles should always remain the same. If the dentist has a good understanding of the principles involved, he can solve the problems presented by the deviation from normal anatomy or position.

SUMMARY

With the help of good study models properly diagnosed and planned, no occlusal equilibration should be too complicated. A color marking system that differentiates the various functional positions will allow the study model to act as a blueprint and an aid.

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Esthetics in anterior fixed bridge prosthodontics

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Objectives of crown and bridge prosthesis are restoration of function and the restoration of esthetics. This paper reviews and emphasizes some of the more important points in the achievement of an esthetic replacement in anterior fixed bridge prosthodontics.

PREPARATION OF ABUTMENT

The success of a restoration starts with the preparation of the abutment; this is obvious when failures and successes are analyzed from an esthetic point of view. A few points regarding the selection of the retainer and its preparation will be considered. The three-quarter crown is perhaps the most widely used retainer for upper anterior abutments. Although it has its limitations, it satisfies to a great extent the requirements of a retainer. It is in its preparation, however, that the practitioner may go amiss (Fig. 1, left) particularly in the mesial and distal slices which usually are the first steps of this preparation.

Insofar as possible, the characteristic contour of the tooth from the labial aspect must be maintained; that is, from a labial aspect the tooth should still retain its square, ovoid or tapering contours. Stated another way, the mesial and distal slices should reduce only the height of contour and there should be no attempt with the mesial and distal slices to establish the labial margins of the preparation. The extent to which the labial margin is produced with these slices depends only on the original contour of the tooth and will be a result of that contour rather than of the initial attempt to establish this labial margin. It must be kept in mind that flat, rigid disks are being utilized to produce these cuts. If, for example, an attempt is made to establish the margin toward the gingiva in a self-cleansing area, this flat rigid disk will overextend the margin at the incisal third. This explains why many times an unnecessary amount of gold is displayed at the incisal third from the labial aspect.

After the procedure has been completed to the point of preparing the mesial and distal resistance grooves, the practitioner returns to the labial margin. Whether or not an incisal resistance groove has been used, the starting point of the mesial and distal grooves is approximately the same. These grooves are prepared parallel with the labial incisal two-thirds. This will provide the longest possible grooves and will, generally, avoid the mesial and distal concavities. These grooves will, however, be "tucked in" behind the labial line angles. Insofar as possible the dentist is actually establishing the labial margin of the preparation with the labial wall of these grooves, so that not only the direction of the groove but the eventual esthetics resulting from this preparation may be controlled.

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Chairman, crown and bridge prosthesis, School of Dentistry, Emory University.

One other point concerning esthetics should be emphasized: it is not necessary to show any gold on the incisal edge. The preparation of the incisal edge should be accomplished on a bevel toward the lingual surface and this bevel should start from the height of contour of the incisal edge. Again, this should result in almost total hiding of the gold from the direct labial view.

Whether an incisal resistance groove is to be used will depend on the labiolingual bulk on the incisal edge. If the tooth is too thin labiolingually, the placement of a resistance groove will, of course, result in discoloration about the margins of the crown from a labial aspect within a few months after cementation. This bulk is adequate in a majority of cases, and it is improper preparation of the lingual surface toward the incisal edge after the accomplishment of the incisal bevel which results in inadequate bulk for the resistance groove.

A good rule to follow in many preparations is to remove a uniform amount throughout; thereby, the original contours of the teeth can be retained in many instances. If, however, this bulk is inadequate, the use of a lingual step or of trusses must be considered in order to provide the required rigidity in castings.

If a fixed prosthesis is to be furnished the patient, the operator cannot limit himself to the use of the three-quarter crown and meet the requirements of a fixed prosthesis, either esthetically or in relation to retention of the prosthesis. Other types of retainers must be selected which better answer the individual needs. The modified three-quarter crown is one which has been found to be invaluable (Fig. 1, center). This is the preparation which utilizes one resistance groove, an incisal pin and a lingual pin for retention. There are many instances in which its use is preferable to that of the three-quarter crown. In some ovoid teeth the mesial surfaces often lend themselves to an adequate resistance groove, whereas the distal surfaces do not. In attempting to prepare both the mesial and distal surfaces, the esthetic objective of replacement may be defeated. Also, in instances where teeth are slightly tipped or rotated, two slices can be made, one on each of the abutments, and the line of insertion directed without the overreduction of one or more surfaces so that the prosthesis may be inserted; in other words, to make four parallel slices frequently leads to unesthetic results.

There are instances where the placing of even one slice for a preparation impairs rather than enhances a result; for example, in the short, bulky teeth which do not allow for adequate resistance grooves in either the mesial or distal surfaces. In such instances, it is possible that the retainer should be the three-pin hood (Fig. 1, right). When this retainer is supplemented with trusses on the lingual surface to provide for the necessary rigidity of the casting, it has many valuable uses in fixed prosthesis.

PROBLEMS OF SPACING

There are other details in the construction of anterior fixed bridgework which are worth emphasizing. It is necessary at times to place a facing where the space seems too small. If such a facing were placed within the space it would be unesthetic because the harmonious effect would be lost. The dentist must keep in mind that an esthetic effect means harmony in contour and color, and that there are many things which go to make up this effect. In the example shown in Figure 2, above, the space does not seem large enough for placement of a facing. However, it is possible to place this facing so that it overlaps slightly the adjacent abutments and carries out irregularities which are already apparent in the mouth; thus harmony is achieved. The incisal opaque staining should reproduce any or all white opaque, brown or other inperfections.

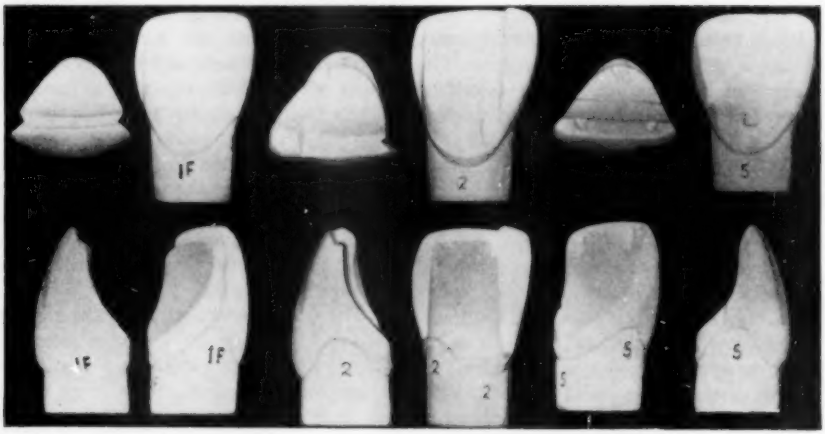

Fig. 1 • Left: Preparation for a three-quarter crown. Center: Preparation for a modified three-quarter crown. Right: The three-pin hood (Courtesy of J. Raymond Gill, School of Dentistry, University of California)

Another detail is the refining of the retainers just prior to taking the impressions for the working model. The excess bulk of gold on the mesial, distal and incisal surfaces after casting must be reduced. This should not be done on the working models as it is not possible to get the proper perspective on these models. The reduction will accomplish many things. It will provide for the maximum space into which the facing can be ground and will, to a great extent, obliterate the gold margin of the retainer and the soldered connector from the labial view. The importance of this reduction cannot be overemphasized. It should also be stressed that the facing selected should be slightly large, if anything, for the space. Such a facing will provide for the necessary bulk of porcelain for its preparation, and it can then be spot ground into position and shaped to harmonize with the abutments.

In many instances, one or more of the abutments have moved because of the loss of an adjacent tooth. Orthodontic treatment is indicated to reestablish normal alignment (Fig. 2, center). Retainers have been prepared and temporarily seated prior to obtaining this movement. In the example shown, after the central incisor had been brought into contact with the adjacent incisor, impressions for the working model were taken, and the bridge acted as an absolute retainer after the orthodontic movement. The importance of consultation with the orthodontist and use of orthodontic appliances when preparing a mouth for a better prosthesis cannot be overemphasized. If, however, spaces exist generally throughout the anterior region, it is not desirable to close any space. A type of connector must be used that will maintain the space or diastema. The bar type connector, shown in Figure 2, below, provides an esthetic result. Occasionally, it is possible to use a bar type of connector to connect the pontic with both retainers. This gives a normal appearance of space between teeth rather than filling in the space with an unsightly solder connector. These bars, however, must be rigid enough to stand the stress to which the prosthesis will be subjected; furthermore, they must be just off the supporting tissue so that floss

may be passed underneath the bar for proper cleansing.

In any discussion of esthetics, the consideration of the type of porcelain replacements utilized cannot be omitted. The author believes that the most esthetic facing is the long-pin porcelain facing. In the past, inadequacies in porcelain facings have been due, principally, to the lack of condensation of the porcelain. The new vacuum-fired pin facings now available are well condensed and have the desired strength. Proper preparation of this facing for its backing is, of course, a requirement. A long-pin facing allows for the protection of the incisal edge. If the same approach is used as in the preparation of the three-quarter crown, it is not necessary to show any amount of gold from the labial aspect. These facings can be arranged in any way indicated for the individual patient and they will produce the artistic result so much desired (Fig. 3, above).

Another anomaly is the instance in which there is more than the normal

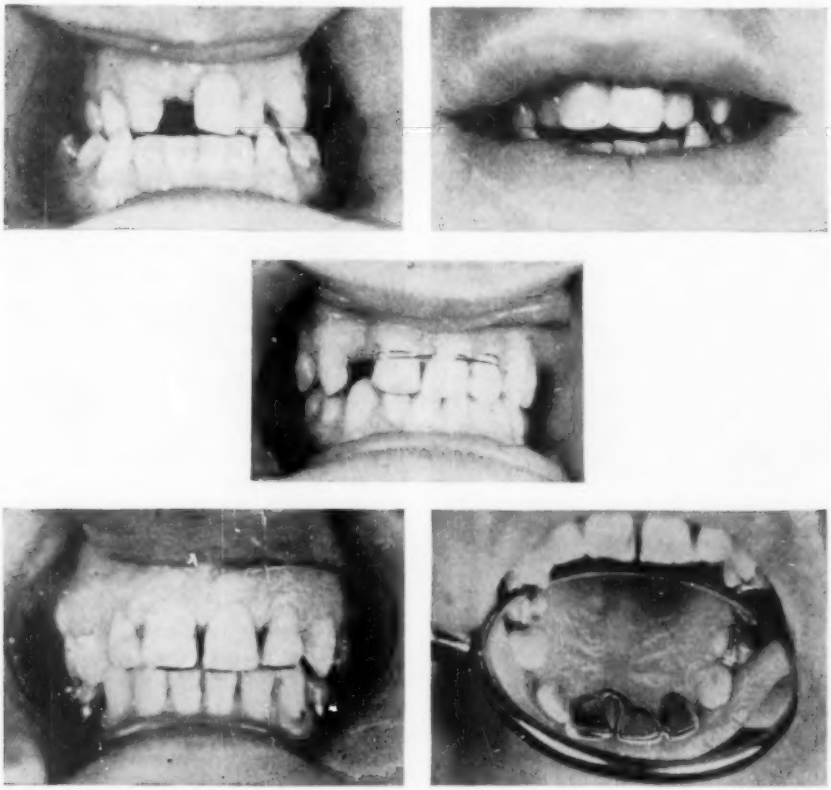

Fig. 2 • Above: The placement of upper right central incisor where space is inadequate and irregularities exist. Center: Simple orthodontic treatment used to close space between lateral incisors. Below: The bar type connector used to maintain normal space between central incisors

space for a single missing tooth, which provides space for two replacements instead of for only the one which is missing. Such an anomaly presents an excellent chance for the dentist to use ingenuity. Figure 3, center and below left, shows an example in which the abutments are the upper left central incisor and the upper right lateral incisor, the upper right central incisor having been lost. If an attempt were made to place the missing central incisor in this space, it would obviously produce an unesthetic result. If a central and a lateral incisor were placed in this space it would look from the labial aspect as if there were two lateral incisors on the right side, and this would create lack of symmetry. The lateral incisor that is the abutment in this instance obviously occupies the position of the upper right cuspid. Therefore, to produce the desired harmony, this upper right lateral incisor must be prepared on its incisal edge to simulate a cuspid. The right lateral incisor now harmonizes with the left cuspid and symmetry has been restored to the upper anterior segment.

One of the replacements most frequently needed in the anterior mouth is probably the lost lateral incisor (Fig. 3, below right). It is the author's opinion that this is the one instance in which the "wing bridge" can and should be utilized. Observation will show that this type of construction frequently renders the longest service of all fixed prostheses. The type referred to is strictly a single bridge replacement and does not have any attachment or arm on the adjacent central incisor. In such instances, judgment must be used in the treatment planning.

If the central incisor is involved with caries or restorations, it might be considered for use as an abutment. Probably more important, however, is the study of the occlusion. If there is a normal overbite-overjet relationship, this type of construction will serve very well; it will also where there is more than normal overjet with little or no overbite. It should be obvious, however, that if there is a deep overbite with little or no overjet, the problem of replacement becomes complex. The central incisor must certainly then be considered for use as an abutment.

ESTHETICS OF THE FULL-VENEER RETAINER

The problem of the anterior replacement cannot be left without discussing the need for a full-veneer retainer to obtain an esthetic result. This need is apparent for mouths in which extensive restorations involve a good deal of the labial surfaces, or for those which present anomalies of form or color which must be corrected to produce a pleasing result. Many patients are satisfied with the porcelain jacket crown which is and always has been the most esthetic restoration. Of late, however, many schools are omitting the construction of the porcelain restoration from the training and others are content with teaching the placement of one such restoration. This is woefully inadequate training for the young dentist who may wish to prescribe a porcelain restoration.

In addition, the widespread use of acrylic resins in dentistry has caused a severe setback in the use of porcelain. There must be a re-evaluation of teaching and ideas relative to the use of these two materials. Certainly, for the unit restoration, if the conditions are favorable, particularly the occlusion, the porcelain jacket is by far the best restoration. At the same time, the limitations of any material must be realized. Porcelain is brittle and will not stand undue stress. Therefore, in patients who have a deep overbite and little or no overjet in the anterior region of the mouth, the use of a full porcelain crown is contraindicated. In such instances, failure would result, with a fracture of the porcelain across the area of the cingulum. Under such circumstances a more durable type of

restoration is indicated; one which will, at the same time, accomplish the objectives of esthetics. A restoration in which acrylic resin is used is shown in Figure 4. The crown is of the open-face type; that is, with a shoulder on the labial, mesial and distal sides of the tooth. After the complete blue inlay waxup, the open-face portion is cut out prior to casting. Inadequately shown in the illustration are the undercuts on the mesial and distal sides for retention of the acrylic material. This type of restoration provides for full gold coverage of the preparation. This is important in several ways. First, in providing for full gold coverage, cement is

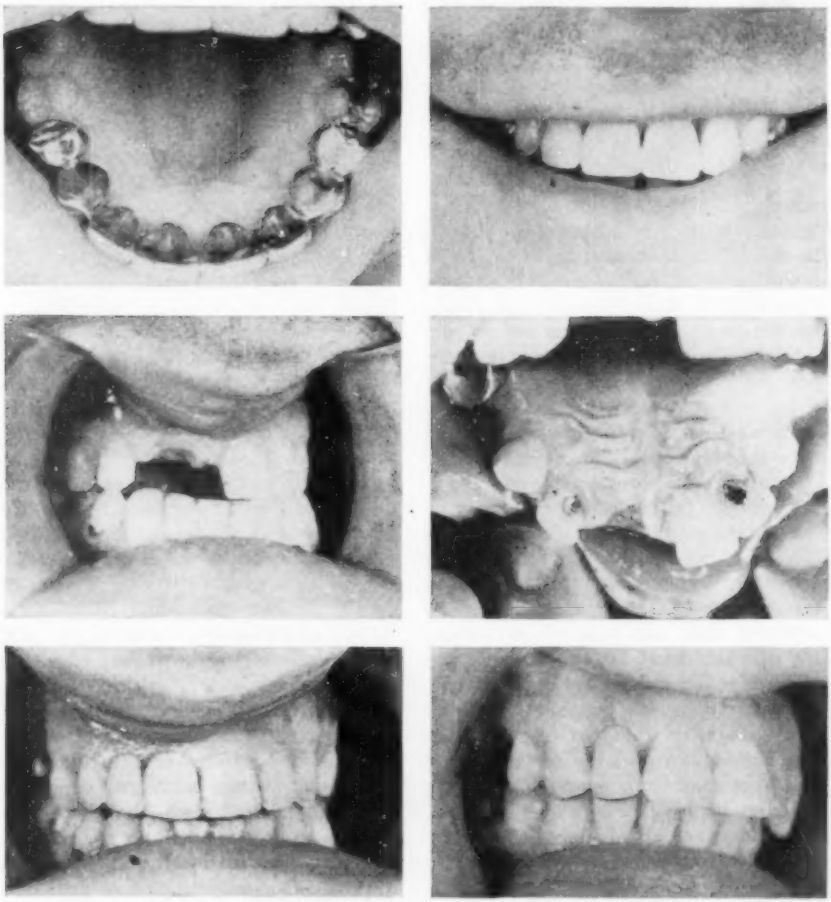

Fig. 3 • Above: Esthetic arrangement of upper four anterior long-pin facings. Center and below left: The incisal edge of the upper right lateral incisor has been prepared as a cuspid to produce symmetry. Below right: Wing bridge replacing upper right lateral incisor with no connector to upper right central incisor; modified three-quarter crown used as retainer on cuspid

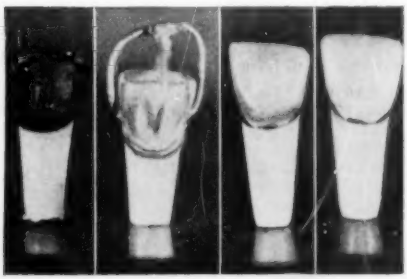

Fig. 4 • Models showing procedure from the blue inlay waxup stage with cutout, the casting, the white ivory waxup and the complete gold-acrylic combination open-face crown

not placed adjacent to the acrylic veneer. Secondly, there are no pressures applied to the acrylic resin on cementation that might tend to break the acrylic resin loose from its undercuts and cause leakage between the acrylic resin and its gold retainer. The net result is adequate retention for the acrylic resin and stability of color. After casting, all margins and shoulders should be polished, but not the open-face portion of the crown.

White ivory wax is then used to wax up the open-face portion. This must be done in the mouth. No model is adequate for this procedure. Many excellent articles have discussed color in anterior restorations. Before success can be achieved with this type of restoration, the operator must be aware that color involves many things. He must become extremely conscious of contour and all labial markings that produce contour. The highlights are what differentiate one type of contour from another; that is, the tapering ovoid and square. Therefore, the contour and all labial markings of the adjacent teeth must be reproduced to attain a harmonious effect in the restoration. Only if there is exactness in the reproduction will the restoration blend in with the adjacent teeth and achieve good matching color. This does not mean to imply that bulk is of no consequence, but the bulk depends on the proper preparation for this type of jacket or crown. The requirements for this, however, do not differ from the requirements for the full-porcelain veneer. The thinnest possible cast veneer covering the stump in the open-face portion of the restoration usually will provide adequate bulk for the acrylic material. The author has not found masking materials of any significance and does not use them. This type of restoration is useful when the occlusion is unfavorable to porcelain. Another type of open-face crown that achieves an esthetic result, is, of course, one made of porcelain instead of acrylic resin. The porcelain restoration, however, has been well covered in the dental literature.

OPEN-FACE ACRYLIC CROWN

The open-face acrylic crown can be used both as a unit restoration and as a retainer in fixed prosthesis. There should be no hesitation in using this type of retainer adjacent to a porcelain pin facing, as the same harmonious effect can be produced whether the adjacent teeth are natural or have porcelain facings. An example of this is shown in Figure 5, first row. The amount of the protection of the incisal edge should be determined, of course, in each individual instance. If there is an end-to-end occlusion, the gold should fully cover the incisal edge. To achieve an esthetic result in the unit restoration, the adjacent teeth again must be considered. If the adjacent teeth have interproximal foils or three-quarter crown restorations with gold showing from the labial aspect, the restoration should be constructed to harmonize. This means that it is necessary sometimes to provide for the imitation of gold foils or three-quarter crowns when cutting out for the acrylic veneer. Esthetic results are in direct proportion to attention to details.

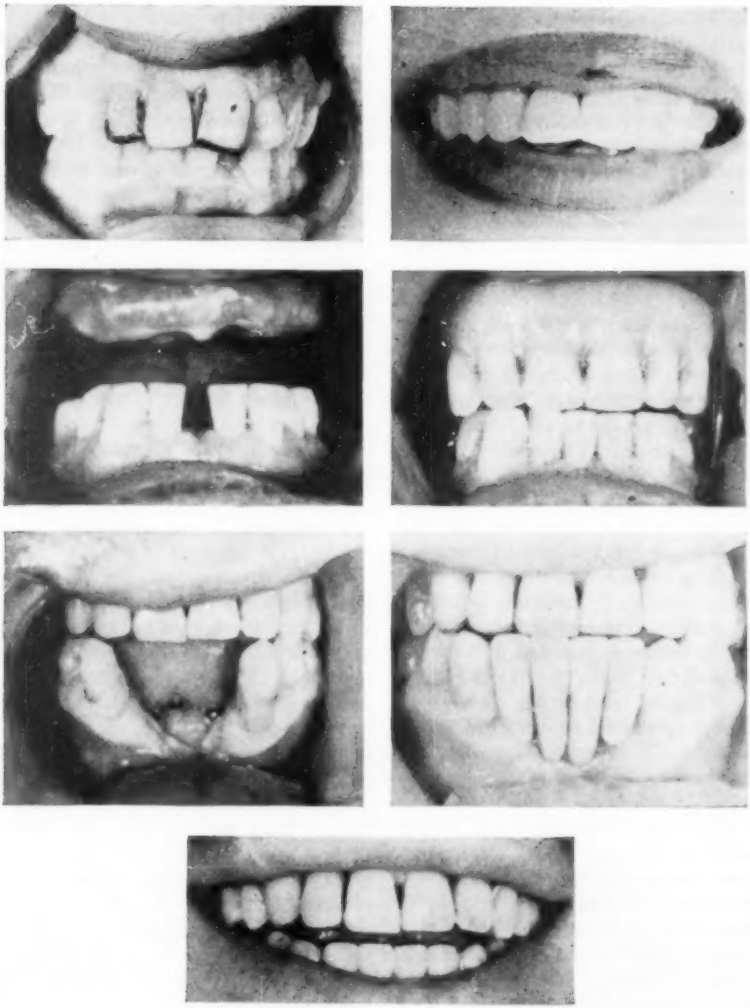

Fig. 5 • First row: Before and after treatment, utilizing acrylic open-face crown and long-pin porcelain facing. Second row: Utilization of three-pin hoods for replacing lower anterior tooth. Third and fourth rows: Before and after treatment used in case of traumatic injury

LOWER ANTERIOR REPLACEMENTS

The lower anterior replacement is one of the more difficult procedures. This is particularly true for the operator in the early years after graduation from dental school. The difficulties are partly responsible for the fact that many dentists avoid the fixed prosthesis and fall back on the removable replacement that requires no operation on the natural dentition.

In a discussion of the lower anterior replacement, it should be emphasized even more that the three-quarter crown is seldom the retainer of choice. Here again, the contours of the teeth and the alignment of one abutment to another lend themselves better to the preparation of other types of retainers. The three-pin hood can and should be used extensively for this replacement. The modified three-quarter crown is also valuable. And, of course, a type of full restoration, either the open-face type crown or the full jacket, is needed to obtain an esthetic result in those instances in which the teeth have been extensively restored. There are many modifications suitable for use in the lower anterior replacements, so let it be understood that when the three-quarter crown is termed inadequate, reference is made to the standard type. Figure 5, second row, shows a replacement that has been accomplished by the use of three-pin hood retainers. As shown here, these teeth lend themselves very well to the three-pin hood; also, there is adequate bulk for the pin type of retention.

Many times a dentist is called on to construct a fixed prosthesis because of a traumatic injury. Traumatic injuries will often present unusual problems. An example is given in Figure 5, third and fourth rows, which shows an instance where the lower four anterior teeth were lost as the result of a gunshot wound during the fighting in Korea. The mandible was fractured and, after healing, posed the problem of replacement. The removable types of appliances were contraindicated for several reasons, the main one being discomfort. The patient strenuously objected to even finger pressure on the ridge area.

The fixed replacement was the choice, but certain things had to be kept in mind; the construction of the pontics had to be such that it would discourage what could be a disastrous tongue habit. The pontics had to be lengthened so that the root tips rested on the ridge in normal anatomic relationship. This would prevent the tongue habit from loosening one or both of the retainers, or from creating excessive trauma on the abutment teeth. The length of the porcelain in such a case required adequate backing by gold castings on the lingual aspect to strengthen the porcelain facings. Thus a desirable restoration was produced and a good esthetic appearance created with the lip in normal position.

SUMMARY AND CONCLUSION

To meet the requirements of retention and esthetics in an anterior fixed prosthesis, one must start with the selection of the retainer and preparation of the abutment. The three-quarter crown is the retainer that answers perhaps the greatest need; because of variables in form, bulk and alignment, however, the dentist must be able to modify this preparation. He therefore must learn to use as basic preparations the modified three-quarter crown and the three-pin hood. It is in the preparation for these retainers that the dentist many times goes amiss, and the result is actual overreduction in one or more of the steps of the preparation which results in an unnecessary display of gold.

The selection of the porcelain replacement is of equal importance. It must fill the space adequately and harmonize in size, contour and color. Many times staining is necessary to produce this harmony of color. A type of full veneer crown must be used in those instances

where the esthetics of the individual tooth has been lost because of fracture or extensive caries or restorations.

The porcelain jacket is the restoration of choice when indicated. Occlusion will, at times, contraindicate the use of a brittle material such as porcelain. At such times it is the open-face type of crown of either acrylic resin or porcelain that should be utilized.

The success of the gold-acrylic resin combination type retainer depends on the attention given to many details having to do with color. In the main, these details concern the reproduction of contour and all minute labial markings which produce highlights. Highlights produced by the reflection of light take on certain characteristics of form and color.

Various types of connectors are essential to carry out the symmetry of the mouth. To achieve ideal esthetic results, the soldered connector must be obscured from the labial view, and proper refinement of the retainers prior to the taking of impressions for working models should accomplish this. Other than soldered connectors must be planned for reproduction of a diastema which is normal for an individual instance. It is apparent that no one point is more important than another in the construction of the fixed bridge.

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The dentist's capabilities in the management of mass casualties

Russell W. Sumnicht, D.D.S., Washington, D.C.

More than nine years has elapsed since the first atomic bomb was dropped over the Japanese city of Hiroshima, yet the majority of experts still talk about what should be done to meet atomic disaster, but say very little about what has been done or what is being done at the present time. Those who are charged with the planning have done an outstanding job. With a few exceptions, however, not enough individuals have been reached and persuaded to put an effective plan into operation. Russell W. Bunting of Ann Arbor, Mich., dental consultant to the Federal Civil Defense Administration, members of the American Dental Association Subcommittee on Civil Defense headed by Carl Sebelius of Nashville, Tenn., and other individuals and groups of individuals in dentistry have more than met their responsibilities in this regard, but for the most part, the role of dentistry in atomic warfare must be discussed in the light of what should be done rather than what has been done.

Before the dentist's capabilities in the management of mass casualties can be evaluated, it is necessary to know just what the need for the dentist will be. A

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closely related and very important consideration is that of improving or multiplying the capabilities or the potentialities for mass casualty care existing in the dentist. These, then, are the three headings under which this presentation has been organized:

1. The need for the dentist.
2. The capabilities of the dentist in the light of that need.
3. The training by which these capabilities for mass casualty management may be improved or multiplied.

NEED FOR THE DENTIST

What position in the casualty management team will the dentist be expected to fill in a disaster situation? During what period will the dentist's services be required? What are the types of casualties to be expected, and how may the dentist best contribute to the treatment effort? These are among the important questions to be answered in determining the need for the dentist.

The position the dentist is expected to fill is indicated by a study of the aid station organization proposed by the Federal Civil Defense Administration. The organization plan of these aid stations, as shown in Civil Defense manuals, lists a physician at the head of a group consisting of 232 trained personnel. The number two man in these listings is a dentist. Very often no physician will be available to supervise the group and a dentist will be expected to assume the position of leadership in a team of first aid workers upon whom the success of the recovery effort may so much depend. Not only Civil Defense but also Department of Defense officials, leaders of the medical profession, and others involved in disaster planning look to the dental profession to assume such key roles. Are dentists prepared to meet this responsibility? It is doubtful whether many dentists realize fully or take seriously the special obligation.

Col. Frank Bauer, director of the Medical Division, Army Medical Service Graduate School, recently had this to say on the subject:

> In these new situations many of the parts of total patient care now done by the physician will be transferred to other individuals. These duties involving patient care might be carried out with or without supervision, depending upon what is involved. Among the first groups that enter my mind are the dental practitioners. . . . Keep in mind that the undergraduate training of . . . these professions is essentially similar to medicine. Their daily peacetime duties require understanding of more of the basic premises of medical sciences and, with a little reorientation, these people could be capable of taking over rather responsible jobs in the medical team.

The second consideration of importance in determining the need for the dentist is the time in which the dentist's services will be most required. His services will be most urgently required during the first few days immediately after the detonation of the nuclear weapon, the period during which the shortage of physicians and nurses, those who ordinarily care for traumatic injuries, is the most acute. His energies should be concentrated on preparing himself to contribute to the solving of the casualty care problems as they exist during this emergency period.

The third important consideration is the casualty problem to be expected during the emergency period, and the means by which dentists may best contribute to their care. Nuclear weapon casualties fall into three main categories—those caused by radiation, by blast, and by burn.

The most misunderstood aspect of atomic disaster and the one about which the greatest amount of misinformation has been issued is the associated radiation problem.

Although many ionizing radiation injuries will be present to complicate the casualty care problem, the dentist need not concern himself to any great extent with preparing to meet this type of cas-

ualty, because radiation injuries cannot be diagnosed until symptoms appear. Those who develop symptoms within the emergency period, the period in which the dentist's services will be most urgently needed, will be largely those who have sustained fatal doses of ionizing radiation.

The types of casualties that will be of immediate concern after an atomic explosion will be those which nations at war or victims of natural disaster have experienced down through history. Their overwhelming numbers, however, give them new and terrifying significance. These are casualties caused by blast and heat.

The tremendous number of burn casualties, and the extensive care and great quantity of medical supplies and equipment normally required to treat even one case of serious burn, make the burn problem a particularly serious one. If the dental profession were to concentrate its effort toward the treatment of just one type of casualty, it could do more good by learning to treat burns than by learning to treat any other single type of casualty.

Blast and burn casualties resulting from the explosion of an atomic weapon will be the same type of traumatic and thermal injuries as the military forces and some civilian populations have experienced in the past. There is nothing new about them except for the great numbers expected and the possibility of their being the result of enemy attack on American cities.

CAPABILITIES OF THE DENTIST

The dentist's capabilities in an atomic disaster situation result largely from (1) his academic training, (2) his professional experience, and (3) a native manual dexterity which has been enhanced by professional experience. His professional education provides a knowledge of human anatomy, physiology, pathology, pharmacology, anesthesia, principles of medicine, principles of surgery, and so forth. In the routine daily practice of his profession, he acquires experience in recognizing and treating pain, infection and shock, in controlling hemorrhage, in anesthesia, and in prescribing drugs. In addition, the average dentist has a digital dexterity which enables him to master unfamiliar procedures in a short period of time. The ability to coordinate hands and eyes in the accomplishment of delicate dental operations is an essential for graduation from dental school. The nature of his profession further develops these abilities which are important in determining the dentist's capabilities in the emergency treatment of atomic casualties.

Of all members of the dental profession, the oral surgeon is the one having a clear-cut responsibility—the emergency care of oral and maxillofacial injuries, particularly with regard to lifesaving measures. This type of casualty will probably keep the oral surgeon busy, but he should be prepared to devote his special talents to surgical procedures elsewhere in the body if the need arises and the situation warrants. The oral surgeon, being the member of the dental profession whose professional activities are most closely associated with the treatment of traumatic injuries, has a special responsibility in assuming positions of initiative and leadership in preparing the other members of the profession to render effective assistance in a disaster situation. It is gratifying to note that many oral surgeons have assumed such positions of leadership.

The prosthodontist's special skills in the designing and fabrication of appliances for the immobilization of bone and other tissue fragments and his familiarity with the handling of plaster and other materials could be adapted readily to the assistance of the orthopedic surgeon and others treating injuries of other parts of the body.

The man experienced in oral diagnosis and treatment planning could very readily adapt his talents to the evaluation and sorting of casualties. Military medical experience has proved the value of effective triage in the saving of lives and returning the maximum numbers of casualties to duty in the shortest possible period of time. In atomic disaster, this aspect of casualty care will be of critical importance, not only because of the shortage of health service personnel but also because of the need for conservation of medical supplies and medical treatment facilities.

Orthodontists and pedodontists have a talent very useful in the handling of child patients—an understanding of child psychology and a knowledge of how to carry a child patient through the difficult period of pain, stress and fear. The child casualty problem associated with an attack on a civilian population will be extremely serious.

Individual dentists often have special capabilities of value to the over-all effort; for example, dentists who have various degrees of special training and experience in anesthesia, roentgenology, pharmacology, military medicine and operating room technics. The dentist's familiarity with the oral and upper respiratory regions is another asset of value in resuscitation of casualties.

EDUCATION AND TRAINING

Not only is the dental profession expected to fill a key role in any recovery effort, but its members constitute the most significant existent potential for assisting or replacing physicians in the management or supervision of management of mass casualties.

Because the medical potential of the dentist can be utilized effectively, however, the dentist, in most instances, must undergo some additional training. With training and application, this potential can be increased many fold. He has varying degrees of academic knowledge concerning such procedures as general anesthesia, intravenous therapy, resuscitation, treatment of burns and of various types of traumatic injuries. Practical application of these procedures on a training basis would provide an additional and substantial source of professional health personnel who could participate in the recovery from an atomic disaster.

If a program of education and training for the dentist is to be established, certain points must be considered. Among these are: (1) the training needed to enable the dentist to be the most effective, (2) the determination of who should be responsible for the training and of how the training should be organized, and (3) the various methods by which training may be accomplished and knowledge disseminated.

Among the more important subjects to be included in the training of dentists should be weapon phenomenology; organization and planning for casualty care together with the accompanying problems of communication, transportation, evacuation and supplies; triage, or the sorting, evaluation and disposition of casualties; treatment of burns; maintenance of airways; surgical closure of wounds; anesthesia, both local and general; emergency intravenous therapy; treatment of shock; alleviation of pain associated with various types of injuries; recognition of brain injury and other serious wound complications, and administration of chemotherapeutic, narcotic and other drugs.

Also of considerable importance is an up-to-date knowledge of, and familiarity with, recent developments in methods, equipment and materials for emergency treatment of casualties. Such developments and improvements have been largely responsible for the pronounced increase in effectiveness of medical services in the treatment of battle casualties of recent wars. Examples of some of

these developed within recent years are dextran and the other blood plasma expanders used to such advantage in Korea; collapsible plastic containers for these and other intravenous fluids which take much less shipping space than other containers, can be discarded, are much more conveniently handled than other containers and can be readily adapted for use when pressure is needed in forcing fluids; efficient field type sterilizers; surgical instruments such as clamps and retractors developed for multiple use and easy sterilization; prefabricated burn dressings; the new air pressure immunizing gun for rapid administration of multiple immunizations; the open method as compared with the closed method of treating burns; opaque x-ray film for field use which can be read without the use of special illumination; improved portable field x-ray equipment; improved collapsible and portable field equipment such as litters and operating tables; new drugs of various types, and others.

Naval officers of the U. S. Navy Dental School at Bethesda, Md., recently have developed training aids for teaching venopunctures, blood typing, tracheotomies, and the treatment of various types of wounds—these were displayed at recent annual sessions of the American Dental Association and other dental and medical meetings. Others, less familiar, are being developed by Army personnel at the Armed Forces Institute of Pathology.

The responsibility for organizing and conducting a training program for dentists is one which the dental profession itself has quite properly assumed. Dentists should, however, seek the guidance of and consultation with Civil Defense officials, physicians and other groups who have the responsibility of coordinating all activities and who are in a better position to know what type of training is most needed. Furthermore, wherever possible, use should be made of physicians and those in other groups who are better prepared to give many types of training. Because of its importance, training could be organized carefully and supervised closely to make certain that the most effective program is developed and sustained.

Every possible means should be explored for stimulating interest and accomplishing the desired training. Among the methods suggested for consideration are these: (1) continued, and, in many instances, increased stress on self-training programs among local groups and societies; (2) provision of training outlines, texts and materials written by authorities and specialists on all pertinent aspects of needed training; (3) establishment of a carefully organized and sustained program of articles on the subject to be published in national dental periodicals and journals; (4) production and distribution of training films—the Armed Forces and other federal agencies already have many such films which have been utilized to varying degrees for the training of dental groups; (5) organization of teams of instructors available for the instruction of local groups and societies; (6) organization of courses of instruction in military medical service schools open to civilian professional personnel which would make available the knowledge and experience gained by the military services in combat; (7) serious implementation of a new program of professional type training currently being issued to Army Reserve units for the training of Army Dental Corps Reserve Officers, and (8) the adaptation of the MEND program to undergraduate training of dentists.

A program of training is routinely followed by U. S. Army Reserve units. Until recently these programs for Reserve Officers of the Medical Services have been largely a coverage of organizational, administrative and other purely military material. For some time a need has been felt for more material of a professional type of particular importance

in the military service. Such programs for the Dental Corps and for each of the other Corps of the Army Medical Service have been organized and are being distributed to Reserve units. The dental program emphasizes the training of the dentist to prepare him to participate effectively in a disaster situation.

The MEND, or Medical Education for National Defense, is a program which was begun in the school year 1951-1952 as a pilot study in five of the leading medical schools of the nation. The objective of the program is to give the undergraduate medical student training in the emergency care of casualties on a mass basis such as might be faced in a disaster situation; this has been done effectively by adaptation and application of the teaching of each subject to the treatment of mass casualties. It is felt that the possibility of adapting a MEND type program to undergraduate dental education should be considered in preparing the dentist to meet his responsibilities in disaster medicine.

Another method by which dentists might be stimulated to interest themselves in the atomic casualty problem and in methods of giving emergency care to such casualties is by the inclusion of questions on disaster medicine in state board and in specialty board examinations. Every dentist practicing his profession in this country has the responsibility of preparing himself to participate effectively in a disaster situation. Requirements of this type of knowledge for board certification might also be a factor in the inclusion of such training in educational programs.

The three-day civil defense course for dentists organized by Dr. Bunting and conducted at the Civil Defense Staff College in Olney, Md., is an excellent means of orienting potential civil defense leaders in dentistry and of familiarizing them with the organization and the importance of organization for defense. This course was given in July 1954 and February 1955 at which time 67 and 76, respectively, attended. The third course, equally successful and equally well attended, was held in Battle Creek, Mich., last November.

SUMMARY

The capabilities of the dentist for participation in the care of atomic casualties has been reviewed. These capabilities are the result of medical type academic training, clinical experience and a better than average ability to master surgical technics and skills. The potential for casualty care existent in the dental profession may be multiplied many fold by a careful program of education, by reorientation and by practical application of latent knowledge. It is imperative that dentists devote more energy to this problem so that the profession soon may be able to talk more about what has and what is being done rather than what should be done or what ought to be done in the future.

Conscious Endeavor • I know of no more encouraging fact than the unquestionable ability of man to elevate his life by a conscious endeavor. *Thoreau.*

REPLANTATION OF TEETH

By Heinrich Wild, M.D., C.D.S., Basel, Switzerland.

Crain[1] recently reported the experimental replantation of an upper third molar. The writer wishes to report two additional replantations of five and 23 years' standing, respectively.

Case 1 • In 1950 roentgenographic examination of an 18 year old girl revealed deep caries extending distally under the gingiva and bone margin (Fig. 1, left). Normal root treatment would have resulted in an exaggerated reduction of the alveolar bone margin distally, the artificial creation of a periodontal pocket and would have destroyed the crown of the tooth: all this, just to gain access to the root canal.

It was decided to extract the tooth, with subsequent replantation if possible. Extraction revealed considerable divergence of three strong roots and resulted in a fracture of the apical third of the lingual root. The fragment was extracted and discarded. The carious tissue and pulp were removed, the three root canals enlarged, two intact roots were shortened and all three root ends rounded off and polished.

The canals were filled with oxyphosphate cement containing oligodynamic silver powder and pulverized crystals of thymol (Pichler's cement), and gutta-percha points. The pulp chamber and cavity were filled with amalgam. The tooth was replanted in its socket by finger pressure. Splints were not used.

Three months later a roentgenogram showed deep pockets about the replanted tooth, mesially and buccally, from which pus was discharging (Fig. 1, center). Eight treatments of deep periodontal curettage were given. The discharge stopped, and the tooth became firm. A third roentgenogram in 1954 showed the tooth firm in its socket, the gingiva healthy, with no trace of pockets (Fig. 1, right). The tooth has remained thus ever since.

Case 2 • A 37 year old woman reported for a root filling in 1932. The apex of the root penetrated the mandibular canal. Some of the filling material—"nonirritating, resorbable paste for all purposes," as the endodontists

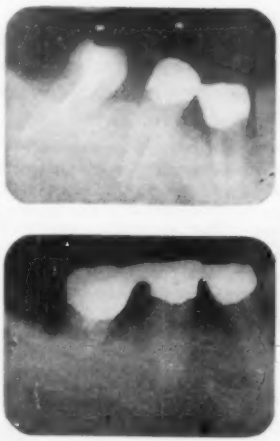

Fig. 2 • Above: Paste forced through apex when filling root. Below: Same tooth 17 years after replantation serves as abutment for bridge

Fig. 1 • Left: Carious tooth of 18 year old girl before treatment. Center: Tooth three months after replantation. Right: 49 months after replantation

of that day used to call it—was forced involuntarily through the apex (Fig. 2, above). The "nonirritating" paste caused a violent trigeminal neuralgia of the right side of the patient's face. Sedatives failed to relieve the condition. It was decided to extract the tooth, with replantation if possible. The extraction was not difficult.

As soon as the socket was empty, blood mounted from its depth, bearing a yellow particle the size of a pinhead; this was the excess material pressed through the apex the previous day. The root was shortened and polished; the tooth replanted and splinted. This tooth was used as one of three abutments for a bridge which was inserted some months later and which has functioned well ever since (Fig. 2, below).

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1. Crain, E. L. Experimental replantation of an upper third molar, J.A.D.A. 50:195 Feb. 1955.

INVERTED MESIODENS

By Cyril B. Kanterman, D.D.S., Camp Rucker, Ala.

Mesiodens are supernumerary incisor teeth, usually located mesially to the central incisors. A routine roentgenographic examination of a 19 year old boy revealed the presence of a mesiodens. The condition was even more anomalous because the mesiodens was in an inverted position (illustration).

Mesiodens, as other supernumerary teeth, result from hyperactivity of the dental lamina, which gives rise to supernumerary tooth germs. The etiology of this condition is obscure. Supernumerary teeth may be a regression to an earlier, more primitive type of dentition which disappeared in the course of evolution. Thus, mesiodens may be the reversion to the dentition of extinct primates who had three incisor teeth. In this respect, mesiodens could be regarded as vestigial.

Because of possible cystic formation, the prophylactic removal of mesiodens is indicated. However, great care must be exercised in the operation to avoid injuring the roots of adjacent teeth.

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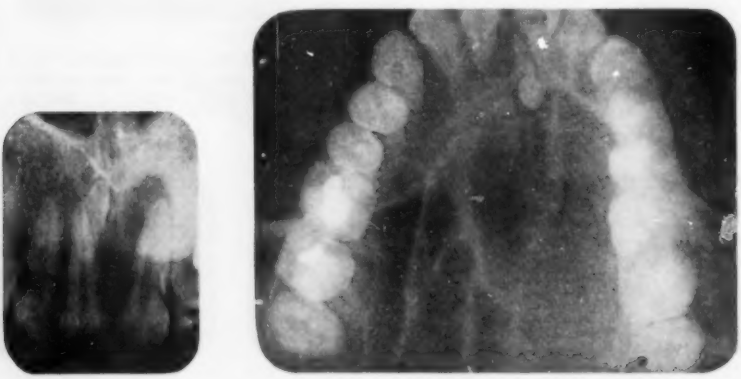


Roentgenograms reveal presence of inverted mesiodens

COUNCIL ON FEDERAL DENTAL SERVICES

Veterans' dental care from the viewpoint of the American Dental Association

Bernard J. Beazley, LL.B., Chicago

The printed program of the Veterans Forum states that its objective is to present authentic information to the interested health groups in Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Nebraska, Ohio, Pennsylvania and Wisconsin so that well informed men of good will can put the medical and dental care problems of the nation's veterans into proper perspective. In preparing this article, attention was directed to the minutes of the first meeting of the Joint Liaison Committee[1] to see what dental problems had been discussed in 1952, and to measure the amount of progress in resolving these problems achieved since that first meeting.

TOOTH ENTITY CONCEPT

Apparently, the veterans' dental care problem that was causing the most headaches in 1952 resulted from the acceptance by the Congress of the United States of the so-called "tooth entity" concept as a yardstick for measuring a veteran's service connection and entitlement to outpatient dental treatment.

The "tooth entity" theory holds that: (1) if a veteran's tooth had no fillings or cavities at the time he entered service, but the tooth was filled or cavities developed prior to discharge from military service, that tooth should be granted service connection; (2) if a veteran's tooth had a filling at time of induction, and the records show subsequent in-service fillings or treatment, that tooth should also be deemed to be service-connected; and (3) if a tooth was removed while the individual was in service, said tooth being sound at time of induction, the tooth space should be given service connection.

Once service connection had been established, the veteran was entitled to have from the Veterans Administration every professional service necessary to support the tooth or tooth space.

The American Dental Association considered the "tooth entity" concept to be scientifically unsound and believed that the Veterans Administration would be confronted with an impossible administrative task if it adhered to such a program. The Association did not in 1952, and does not now believe, that there is anything peculiar to military service which will cause a serviceman to have more or less dental disorders than he

Presented before the Veterans Forum, September 27, 1955, Indianapolis.

Secretary, Council on Federal Dental Services.

1. Meeting of the Joint Liaison Committee of the Indiana State Medical Association, the Indiana Department of the American Legion, the Indiana State Dental Association and the Indiana Hospital Association, Indianapolis, November 1952.

would have had if he had remained in civilian life. Dental caries, for example, affects about 95 per cent of the population. Studies indicate that tooth decay begins during infancy and continues so long as a person has his natural teeth. The occurrence of cavities during a period of military service is something which probably would have occurred if the individual involved had never donned a uniform.

At the present time, a properly placed filling or other restoration is ordinarily all that can be done for a carious tooth or its consequences. If a tooth is filled and subsequently another cavity appears in the same tooth, in most instances the second cavity arises from a separate cause and cannot be said to result from the first lesion. Therefore, if a tooth was filled while the person was in service and the filling was in good order at the time of separation, it would appear that all that could be done with respect to the cavity which occurred in service had already been accomplished, and that there would, therefore, be no cause for establishing a service connection. Similarly, if the record of the veteran shows that service-incurred cavities were present at the time of separation and the affected teeth are in such condition that a filling or other restoration can be made, then the federal government is obliged to provide the necessary services; but once such services are provided and the restoration accomplished, the obligation of the federal government is completely discharged. Again, if extraction is indicated, the obligation of the government is satisfied when the extraction is made and an appropriate prosthetic appliance is supplied to the veteran.

The Association believes that the primary responsibility for personal dental health care rests with the individual and the family. Therefore, if the government has put in a satisfactory filling or supplied an appropriate prosthetic appliance, its obligation to the veteran is satisfied and thereafter the veteran, like all other citizens, should look after his own dental health requirements.

As mentioned before, the American Dental Association believed that the V.A. would be confronted with an impossible administrative task so long as the V.A. held to the tooth entity concept. The administrative snarl resulting from the "entity" philosophy soon became apparent when several hundred thousand veterans turned to the V.A. for outpatient dental treatment at government expense. The V.A. was not equipped nor did it have a sufficient budget to give these veterans all the dental benefits that the "entity" theory promised. At one point, the V.A. had over 300,000 applications pending, of which 240,000 had progressed to the point where eligibility and entitlement had been determined but treatment could not be provided because of inadequate facilities and budget. In addition to the frustration and disappointment experienced by the veteran, the months of delay between entitlement and treatment permitted the original dental disorder to get further out of hand, so that it required more complicated and expensive treatment than would have been required had early treatment been provided.

The "tooth entity" problem was discussed at the 1952 meeting of the Joint Liaison Committee and in subsequent meetings attended by representatives of the American Legion, other veterans' groups, the V.A. and the American Dental Association. Although the Association may not have completely convinced all of the veterans' groups of the difficulties inherent in the "tooth entity" philosophy, the meetings provided an opportunity to discuss the problem thoroughly and to suggest solutions. Recently, legislation was enacted—to which detailed reference will be made later—that relieves the administrative burden of the V.A. in determining dental care entitlements and permits the veterans who are entitled to

outpatient dental treatment to receive the necessary care promptly. The Bureau of the Budget statistics relative to the requested fiscal 1956 appropriation of $11,500,000 for the outpatient dental program of the V.A. indicate that this appropriation will provide eligible veterans with 31,000 examinations and 98,000 treatments on the "home-town" dental program, in addition to 95,000 examinations and 35,000 treatments to be accomplished within the V.A.'s own facilities and by use of separate funds. Note should also be made in passing of the effect of the Presidential Proclamation of January 7, 1955, which declares that military service after January 31, 1955, shall be considered peacetime service. This proclamation will, in time and to some extent, place further limitations on the outpatient dental care provided by the V.A. The Association feels that this proclamation limits the entitlement for outpatient dental care of peacetime veterans to service-incurred dental defects and injuries which are disabling and compensable.

ESTABLISHMENT OF ELIGIBILITY FOR CARE

Another veterans' dental care problem that was discussed at the 1952 meeting of the Joint Liaison Committee was the considerable difficulty experienced by most veterans of the Spanish-American War and World War I and by many veterans of World War II in establishing their entitlement and eligibility to V.A. dental care. This problem grew out of the failure of the military services to keep accurate records describing the condition of the serviceman's mouth at the time of induction and discharge. The House of Delegates of the Association in 1951 and again in 1953 adopted resolutions calling the attention of the military chiefs to the necessity of conducting a thorough dental examination of every incoming serviceman and to make a similar examination at time of discharge, so that the Veterans Administration would have suitable records on which a veteran's entitlement could be quickly determined. The V.A. was, of course, very much interested in such a program and has cooperated in effecting its adoption by the armed services. Every serviceman now receives a complete dental examination, including roentgenograms of the mouth, shortly after induction and also just prior to discharge. These records are preserved and made available to the Veterans Administration when the veteran applies for outpatient dental treatment.

This review of gains achieved since the 1952 meeting of the Joint Liaison Committee indicates that mutual benefit has been derived from the exchange of ideas and information on the medical and dental care of veterans. The Association heartily subscribes to the philosophy that brought the Joint Liaison Committee into being and is sure that all health groups represented in the Veterans Forum will profit by participation in this program.

AMOUNT OF DENTAL CARE AVAILABLE TO VETERANS

As mentioned earlier, the "tooth entity" concept was substantially modified by legislation enacted during the first session of the 84th Congress. Public Law 83, 84th Congress, clarifies the entitlement of certain veterans to outpatient dental care. When this legislation is superimposed on the legislative and administrative directives already in effect, it will be seen that the amount of dental care potentially available to the several eligible classes of veterans can be measured as follows:

1. Inpatient Dental Care

A. Hospitalized Veterans. Unless the hospitalized veteran is considered a long-

term patient, he is entitled only to the dental care necessary for the complete treatment of the condition for which he is hospitalized, whether that condition is dental or medical in nature. A short-term hospitalized veteran would, moreover, be entitled to that type of care whether he is a service-connected or a nonservice-connected patient. Patients hospitalized for chronic diseases receive more extensive dental care since they are, temporarily at least, considered to be wards of the federal government.

B. Veterans in Domiciliary Institutions. Veterans, on admission to a Veterans Administration domiciliary institution, are considered to be permanent charges of the federal government. They are, therefore, provided with the dental treatment necessary to keep their mouths in a healthy and comfortable condition.

2. Outpatient Dental Care

A. Veterans with Service-Connected Compensable Dental Conditions. Veterans in this category are entitled to dental examinations and whatever dental treatment is reasonably necessary for the amelioration of the service-incurred compensable condition. These veterans may apply for dental examination and treatment of their service-incurred compensable conditions at any time and are entitled to recurring episodes of treatment.

B. Veterans with Service-Connected Noncompensable Dental Conditions Existing at Time of Discharge or Release from Active Service. Veterans in this category are entitled to dental examinations and whatever treatment is indicated for the amelioration of the service-incurred condition on a one-time completion basis, unless the services so rendered are found unacceptable within the limitation of good professional standards, in which case additional services may be afforded. These veterans must file their initial applications for treatment within one year after the date of their discharge.

C. Veterans with Service-Connected Noncompensable Dental Conditions Due to Combat Wounds or Service Trauma or Veterans Who Were Prisoners of War. These veterans are entitled to dental examinations and whatever treatment is reasonably necessary for the amelioration of the service-incurred condition. Veterans in this category are entitled to recurring episodes of treatment.

D. Veterans with Dental Conditions Which Are Associated with and Are Aggravating a Service-Connected Medical Condition. Those in this category are entitled to dental examinations and the dental treatment necessary to relieve the dental condition that has been professionally determined to be aggravating an associated service-connected disorder. The dental condition itself need not be service-connected. The limitations on recurring episodes of treatment and the time for filing applications are not applicable to veterans in this category.

E. Veterans Pursuing a Course of Training Under Veterans Administration Auspices. Veterans in this category are entitled to dental examinations and the treatment necessary to prevent interruption of their training. The conditions need not be service-connected. These veterans are entitled to recurring episodes of treatment and may apply for treatment at any time during their period of training.

F. Veterans of the Spanish-American War, the Philippine Insurrection, or the Boxer Rebellion. Veterans in this category are entitled to dental examinations and whatever dental treatment is reasonably necessary to the amelioration of their dental conditions. Public Law 791, 81st Congress, declares that the dental condi-

tions of these veterans are conclusively presumed to be service-connected. The limitations on recurring episodes of treatment and the time for filing applications are not applicable to veterans in this category.

The veterans listed in the preceding categories are, of course, those identified as wartime veterans. The Presidential Proclamation of January 7, 1955, mentioned earlier, limits entitlement for outpatient dental care of peacetime veterans to dental defects and injuries which are disabling and compensable.

The American Dental Association believes that the existing combined Congressional and administrative limitations on entitlement for Veterans Administration outpatient dental care and the limitations affecting the dental care provided for hospitalized veterans and veterans in domiciliary institutions are sound. The program as presently administered offers to all veterans a fair adjustment of their service-connected dental conditions and places the federal government's obligation to the veteran on a philosophically sound basis. In addition, the present eligibility requirements for outpatient dental care have established an attainable mission for the Veterans Administration Dental Service.

OUTPATIENT DENTAL CARE

The House of Delegates of the American Dental Association, at its 1953 and 1954 annual sessions, expressed its position clearly on the scope of Veterans Administration outpatient dental care. In substance, those policies recommend that veterans, to be eligible for outpatient dental care, be required to apply within one year of discharge, that they receive the dental care necessary to correct their service-connected dental conditions, and that they receive whatever dental care is authorized on a one-time completion basis. The Association's policies make exceptions for the categories of veterans presently entitled to make later application and for those entitled to receive continuing episodes of dental treatment. The American Dental Association, therefore, is in substantial accord with the present system for providing outpatient dental care to eligible veterans.

Although this article has been directed primarily toward the outpatient phase of the Veterans Administration dental program, it should be kept in mind that the American Dental Association is also vitally interested in the dental care provided by the Veterans Administration to long-term hospital patients and to the residents of domiciliary institutions. The Association believes that the V.A. should direct more and more of its attention to the dental care problems of these veterans, particularly to the development of procedures designed to provide effective dental service for the chronically ill, as well as for the aged and incompetent veterans.

COUNCIL ON DENTAL RESEARCH

List of certified dental materials revised to November 1, 1955

Because there has been some confusion regarding certified dental materials, the Council on Dental Research presents this summary to clarify the operation of its certification plan.

The first fundamental item in this plan is the existence of official American Dental Association Specifications for Dental Materials. These specifications are the outcome of research by the American Dental Association Research Fellowship at the National Bureau of Standards correlated with the clinical experience of members of the Association.

As the second step in the operation of the plan, the manufacturers are invited to certify to the Council on Dental Research that their products comply with the specifications. It would be manifestly impossible for the Council (through the American Dental Association Research Fellowship at the National Bureau of Standards) to test every lot of every certified material. For this reason, the Council has required that the manufacturer, on certifying a product, not only must guarantee that this product meets specification requirements but also must furnish evidence that he maintains a testing program adequate to insure continual compliance of the product.

On receipt of a certification for a new product with all required data, the Council procures a random sample through regular trade channels, usually by asking a dentist to act as its agent. This sample is tested for compliance with all specification requirements. Only when the certification is complete and in proper form and the sample has passed all specification tests does the Council accept the manufacturer's certification. The name of the product is then added to the list of certified dental materials.

This, however, is not the complete story. The continuation of any product on the list of certified dental materials is contingent on its maintenance at specification quality. Surveys of all products on the list are made by the American Dental Association Research Fellowship at the Council's direction. These surveys are made on samples procured on the open market. Whenever a material fails to comply with the specification requirements, it is removed from the list and the manufacturer is notified that his certification of the product is no longer acceptable. Thus, although the Council cannot test the entire production of dental materials, its certification plan calls for continuous testing by the manufacturer and check tests by the Fellowship so that a constantly high level of quality of the products on the list will be maintained. Revisions of the list appear in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION from time to time.

Lately there have appeared through the mail some advertisements for amalgam alloys, mercuries, zinc phosphate cements and acrylic resins with statements that the manufacturer guarantees them to comply with the specifications of the American Dental Association. An examination of the list of certified dental materials shows that some of the materials that have been so advertised have not been certified by their manufacturers to the Council on Dental Research. The certification program is financed jointly by fede al and American Dental Association funds, and no charge whatsoever is made to the manufacturer. If a manu-

facturer is regularly testing his material, then the only expense he will have in certifying the material to the Council is the cost of the three cent stamp required for mailing the certificate and data. When a dentist sees a statement such as, "Every batch of this alloy is carefully tested before being released for shipment to be sure that it fully meets A.D.A. specifications," he should be certain to check the list of certified dental materials to see if the product appears there.

In the purchase of certified material for use in dental practice, this list should be used as a buyer's guide. In addition, the package of material received should be checked for its exact name as given in the list and for a statement thereon guaranteeing compliance with the specification. The Council should be notified of any discrepancies.

CERTIFIED AMALGAM ALLOYS

(A.D.A. SPECIFICATION NO. 1, FIRST REVISION)

Alloy	*Manufacturer or distributor*
Abner Fine Cut; Oxford	Abner Alloys Co.
Accurate Metalloy (filings)	The L. D. Caulk Co.
Ames Alloy Quick Setting	The W. V-B. Ames Co.
Argentum "A" cut; fine cut; medium cut	Hammond Dental Mfg. Co.
Aristaloy	Baker & Co., Inc.
Banner (filings)	Goldsmith Bros. Smelting & Refining Co.
Baring (improved fine cut)	Baring Smelting & Refining Co.
Brewster Medium	Brewster Laboratories
Certified	Lee Smith Co.
Cresilver	Crescent Dental Mfg. Co.
Dee (filings)	Kerr Mfg. Co.
Fellowship	Dental Protective Supply Co.
Filling Alloy, fine grain	Abe Bass
Fleck's	Mizzy, Inc.
Garfield's	Garfield Smelting & Refining Co.
Gem	Certified Dental Supply Corp.
Gold Bond	Jefferson Dental Supply Co.
H & M Special	Hauser and Miller
Lustraloy Regular	Pfingst & Co.
Minimax (filings) 173; 177; 178; 178 non-zinc; 178 fine cut; 183; White Gold & Platinum; (shavings) 177; 178	The Minimax Co.
Mission No. 5; No. 5 "A" Cut	Henry F. Bruce Co.
Modeloy (quick setting filings)	Crescent Dental Mfg. Co.
Mynol Improved	Mynol Chemical Co.
National Dental	Eskay Dental Products
New Deal	Miller Dental Co.
Oceanic Filling Alloy	Oceanic Chemical Co., Inc.
Odontographic "Improved" (filings)	Odontographic Mfg. Co.
Peerless	Herbert D. Damsky
Precision	Precision Bur Co.
Research Oralloy	Precious Metals Research Works, Inc.
Royal Super First Setting	Garhart Dental Specialty Co.
Safco 69	Safco Laboratories
Silver Crown Fast; Medium; Slow; Non Zinc	General Refineries, Inc.

Silverloy (filings); F.C. #20 for Proportioner; (shavings)	Crescent Dental Mfg. Co.
Speyer	Speyer Smelting & Refining Co.
S-C Medium (filings)	Stratford-Cookson Co.
Standard	Standard Dental Products Co.
Stratco	Edward P. Stratt
Tri-Alloy	Tri-Boro Dental Supply Co., Inc.
True Dentalloy (filings); Cut "A"	The S. S. White Dental Mfg. Co.
Twentieth Century Regular; Special; Fine Cut; Non Zinc	The L. D. Caulk Co.
Ultra Brand; Fast Setting; Regular	H. Jelinek Dental Alloys
Vertex	Vertex Dental Products Co.
White Beauty; Fine Cut	Lang Dental Mfg. Co.
Yates Balanced	J. Yates Dental Mfg. Co.

CERTIFIED INLAY CASTING INVESTMENTS

(A.D.A. SPECIFICATION NO. 2)

Investment	*Manufacturer or distributor*
Baker Cristobalite	Baker & Co., Inc.
Beauty-Cast	Whip-Mix Corp., Inc.
Kerr Cristobalite-Inlay	Kerr Mfg. Co.
Ransom and Randolph Gray	The Ransom & Randolph Co.
Steele's-Super	The Ransom & Randolph Co.

CERTIFIED IMPRESSION COMPOUNDS

(A.D.A. SPECIFICATION NO. 3, FIRST REVISION)

Compound	*Type*	*Manufacturer or distributor*
Certified	I	Lee Smith Co.
Exact	I	The S. S. White Dental Mfg. Co.
Kerr Perfection; No. 2 Soft Green; Grey; White; Black	I	Kerr Mfg. Co.
Mizzy-Low Heat	I	Mizzy, Inc.
S. S. White-Black-Tray	II	The S. S. White Dental Mfg. Co.

CERTIFIED INLAY CASTING WAXES

(A.D.A. SPECIFICATION NO. 4, FIRST REVISION)

Wax	*Manufacturer or distributor*
Baker-Blue—Regular medium	Baker & Co., Inc.
Caulk-Blue	The L. D. Caulk Co.
Kerr-Blue—Hard	Kerr Mfg. Co.
Security	The Cleveland Dental Mfg. Co.
Taggart's Blue	Mizzy, Inc.

CERTIFIED INLAY CASTING GOLD ALLOYS

(A.D.A. SPECIFICATION NO. 5)

TYPE A, SOFT

Alloy	*Manufacturer or distributor*
Aderer-A-Soft	Julius Aderer, Inc.
Baker Inlay Soft	Baker & Co., Inc.
Chilcast No. 1	Vernon-Benshoff Co.
Coe 1	Coe Laboratories, Inc.
Crown Inlay No. 2 Soft; K	General Refineries, Inc.
Deeone	Dee Division of Handy & Harman
GB Inlay No. 1 Soft	Goldsmith Bros. Smelting & Refining Co.
Jelenko Special Inlay	J. F. Jelenko & Co., Inc.
Krause Soft Inlay	Krause Gold Refinery
Leff Light Inlay	Leff Dental Golds
Luft "A"	John Luft Prescription Alloys
Mowrey's S-1; S-M	W. E. Mowrey Co.
Ney-Oro A; AA	The J. M. Ney Co.
Noble No. 1	Noble Metals & Alloys Co.
Research A	Precious Metals Research Works, Inc.
Spyco Soft; Eleven	Spyco Smelting & Refining Co.
S. S. White No. 2; 900 Soft; 940 Very Soft	The S. S. White Dental Mfg. Co.
Stern S	I. Stern & Co., Inc.
Wildberg A-2	Wildberg Bros. Smelting & Refining Co.
Wilkinson 2S	Wilkinson Co.
Williams Inlay 3; Will-Cast 22	The Williams Gold Refining Co., Inc.

TYPE B, MEDIUM

Alloy	*Manufacturer or distributor*
Aderer-B-Medium	Julius Aderer, Inc.
Aleco No. 1; No. 2	A. L. Engelhardt Co.
Baker Inlay Medium	Baker & Co., Inc.
Chilcast M; 2M	Vernon-Benshoff Co.
Coe 2	Coe Laboratories, Inc.
Crown Inlay No. 1 Hard; Knapp No. 2; T	General Refineries, Inc.
Deetwo	Dee Division of Handy and Harman
GB Inlay No. 2 Medium Hard	Goldsmith Bros. Smelting & Refining Co.
Jelenko Modulay; Platincast	J. F. Jelenko & Co., Inc.
Krause Hard Inlay	Krause Gold Refinery
Leff Medium Soft	Leff Dental Golds
Luft "B"	John Luft Prescription Alloys
Mowrey's B-Inlay; S-2; No. 91; T	W. E. Mowrey Co.
Ney-Oro A-1; A-10	The J. M. Ney Co.
Noble No. 2	Noble Metals & Alloys Co.
Spyco Inlay; Medium; Tinker One	Spyco Smelting & Refining Co.
S. S. White No. 1; No. 5; No. 820	The S. S. White Dental Mfg. Co.
Stern 1	I. Stern & Co., Inc.
Wildberg "A"; C-2	Wildberg Bros. Smelting & Refining Co.
Wilkinson 8M	Wilkinson Co.
Williams Pioneer; Special Inlay; One "Inlay"	The Williams Gold Refining Co., Inc.

TYPE C, HARD

Alloy	*Manufacturer or distributor*
Aderer-C-Hard; "Dressel"	Julius Aderer, Inc.
Aleco No. 4	A. L. Engelhardt Co.
Baker Hard Inlay	Baker & Co., Inc.
Chilcast No. 2; No. 2-H	Vernon-Benshoff Co.
Coe 3	Coe Laboratories, Inc.
Crown No. 9; Knapp No. 3; Supreme Inlay; TT	General Refineries, Inc.
Deesix	Dee Division of Handy & Harman
GB Inlay No. 3 Hard	Goldsmith Bros. Smelting & Refining Co.
Jelenko Durocast; Firmilay	J. F. Jelenko & Co., Inc.
Leff C	Leff Dental Golds
Luft "C"	John Luft Prescription Alloys
Mowrey's S-3; Special; No. 120; TT	W. E. Mowrey Co.
Ney-Oro B; B-2; BW	The J. M. Ney Co.
Noble No. 3	Noble Metals & Alloys Co.
Research No. 5; "Inlay"	Precious Metals Research Works, Inc.
Spyco No. One-H; Six; Tinker Two; Hard	Spyco Smelting & Refining Co.
S. S. White No. 8; No. 13; 860 Hard	The S. S. White Dental Mfg. Co.
Stern 2; 3337; H	I. Stern & Co., Inc.
Wildberg "C"; B	Wildberg Bros. Smelting & Refining Co.
Williams Klondiker; Special "Four"	The Williams Gold Refining Co., Inc.

CERTIFIED DENTAL MERCURIES

(A.D.A. SPECIFICATION NO. 6)

Mercury	*Manufacturer or distributor*
Argentum	Hammond Dental Mfg. Co.
Ballard's	Quicksilver Producers Association
Certified	Lee Smith Co.
Chemically Pure	The S. S. White Dental Mfg. Co.
C. P. Mercury	Goldsmith Bros. Smelting & Refining Co.
C. P. Mercury	H. Jelinek Dental Alloys
Crown	General Refineries, Inc.
Dee Brilliant	Kerr Mfg. Co.
Dental	Drug Laboratories, Inc.
Dental, C. P.	F. W. Berk & Co., Inc.
Fellowship	Dental Protective Supply Co.
Garfield's	Garfield Smelting & Refining Co.
Garhart's Positively Pure	Garhart Dental Specialty Co.
Krause's Pure	Krause Gold Refineries
Merck Redistilled N.F.	Merck & Co., Inc.
Mercury C. P.	Metalsalts Corp.
Mercury C. P.	Wildberg Bros. Smelting & Refining Co.
Mercury N.F. IX Redistilled	Mallinckrodt Chemical Works
Minimax	The Minimax Co.
Mission	Henry F. Bruce Co.
Mowrey Mercury	W. E. Mowrey Co.
Mynol	Mynol Chemical Co.
Ney	The J. M. Ney Co.
Odontographic	Odontographic Mfg. Co.
Research	Precious Metals Research Works, Inc.
Spectropure	Baker & Co., Inc.
Spyco	Spyco Smelting & Refining Co.

Twentieth Century	The L. D. Caulk Co.
Williams	The Williams Gold Refining Co., Inc. (Applies to Williams' one pound bottles only, as quarter pound containers are not glass or polyethylene.)

CERTIFIED WROUGHT GOLD WIRE ALLOYS

(A.D.A. SPECIFICATION NO. 7)

Alloy	*Manufacturer or distributor*
Aderer No. 20 Clasp	Julius Aderer, Inc.
Baker Q. A.	Baker & Co., Inc.
Crown Hylastic	General Refineries, Inc.
Deepep-Hard	Dee Division of Handy & Harman
GB Extra High Fusing; Medium Fusing; Regular High Fusing	Goldsmith Bros. Smelting & Refining Co.
Jelenko No. 3 Wire; Super Wire	J. F. Jelenko & Co., Inc.
Ney-Oro Elastic No. 4	The J. M. Ney Co.
Spyco No. 2; No. 4	Spyco Smelting & Refining Co.
S. S. White No. 12; No. 61 Metalba	The S. S. White Dental Mfg. Co.
Stern No. 2657	I. Stern & Co., Inc.
Vernon-Benshoff Clasp Wire No. 6	Vernon-Benshoff Co.
Williams No. 1 Super; No. 2 High Fusing Clasp; No. 3 High Tensile	The Williams Gold Refining Co., Inc.

CERTIFIED ZINC PHOSPHATE CEMENTS

(A.D.A. SPECIFICATION NO. 8, FIRST REVISION)

Cement	*Manufacturer or distributor*
Ames Z-M	The W. V-B. Ames Co.
Bosworth's Zinc	Harry J. Bosworth Co.
Caulk Crown and Bridge; Petroid Improved; Tenacin	The L. D. Caulk Co.
Certicem	Lee Smith Co.
Fleck's Extraordinary	Mizzy, Inc.
Lang Crown Bridge and Inlay	Lang Dental Mfg. Co.
S-C	Stratford-Cookson Co.
Smith's	Lee Smith Co.
S. S. White Silver Improved; Zinc; Zinc Improved	The S. S. White Dental Mfg. Co.

CERTIFIED SILICATE CEMENTS

(A.D.A. SPECIFICATION NO. 9, FIRST REVISION)

Cement	*Manufacturer or distributor*
Ames Plastic Porcelain	The W. V-B. Ames Co.
Astralit	Premier Dental Products Co.
Baker Plastic Porcelain	Baker & Co., Inc.

DeTrey's Synthetic Porcelain; Syntrex	The L. D. Caulk Co.
Durodent Enamel	Oskar Schaefer
Smith's Certified Enamel Improved	Lee Smith Co.
S. S. White Filling Porcelain Improved	The S. S. White Dental Mfg. Co.

CERTIFIED HYDROCOLLOIDAL IMPRESSION MATERIALS—AGAR TYPE

(A.D.A. SPECIFICATION NO. 11)

Material	*Manufacturer or distributor*
Coe-Loid 66	Coe Laboratories, Inc.
Deelastic	Kerr Mfg. Co.
Dentocoll	The L. D. Caulk Co.
Elastic Colloid	The S. S. White Dental Mfg. Co.
Kerr Hydro-Colloid	Kerr Mfg. Co.
Perfectocoll	Baker & Co., Inc.
Plasticoll	Lee Smith Co.
Surgident	Surgident, Ltd.

CERTIFIED DENTURE RESINS

(A.D.A. SPECIFICATION NO. 12, SECOND REVISION)

TYPE I, HEAT-CURING

Material	*Form*	*Manufacturer or distributor*
Acralite	Clear; pink; powder-liquid	Acralite Co., Inc.
Acri-Lux	Pink; powder-liquid	Acri-Lux Dental Mfg. Co.
Acrylic A Pink	Pink; powder-liquid	Austenal Laboratories, Inc.
Acrylic A Mottled	Pink; powder-liquid	
Acrylic A Orange-Pink	Pink; powder-liquid	
Densene 33	Clear; pink; powder-liquid	Cosmos Dental Products, Inc.
Densene 33, Varihued	Pink; powder-liquid	
Denture Acrylic	Clear; pink; powder-liquid	The S. S. White Dental Mfg. Co.
Duraflow	Pink; powder-liquid	Product Research Lab., Inc.
Enciton	Pink; powder-liquid	The L. D. Caulk Co.
Hygienic	Pink; powder-liquid	The Hygienic Dental Mfg. Co.
Improved Justi-Tone T-3	Pink; powder-liquid	H. D. Justi & Son, Inc.
Jectron	Pink; precured blank	Toledo Dental Products Co.
Lang's	Pink; powder-liquid	Lang Dental Mfg. Co.
Lucitone	Clear; pink; powder-liquid	The L. D. Caulk Co.
Lucitone	Pink; plastic cake	
Luxene 44	Pink; plastic cake	Luxene, Inc.
Miracryl	Pink; powder-liquid	The Motloid Co., Inc.
Palatex	Pink; powder-liquid	Rockland Dental Co., Inc.
Perma Cryl	Pink; powder-liquid	Acri-Lux Dental Mfg. Co.
Vernonite	Clear; pink; plastic cake Pink; powder-liquid	Vernon-Benshoff Co.

Vitacrylic	Pink; powder-liquid	Fricke Dental Mfg. Co.
Vita-Lite	Clear; pink; powder-liquid	Vita-Lite Products Co.
Vitalon		
Even Tone	Pink; powder-liquid	Austenal Laboratories, Inc.
Mottle Tone	Pink; powder-liquid	
Tissue Tone	Pink; powder-liquid	

TYPE II, SELF-CURING

Material	*Form*	*Manufacturer or distributor*
Acralite 88, Tissue Tone	Pink; powder-liquid	Acralite Co., Inc.
Acralite 88, True Life	Pink; powder-liquid	
Densene 33	Pink; powder-liquid	Cosmos Dental Products, Inc.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Mortality of dentists, 1951-1954

Since 1951, the Bureau of Economic Research and Statistics has received copies of death certificates of dentists from a majority of the state departments of health. The number of deaths reported through 1954 was 3,707, sufficient to provide reliable statistics on the age and cause of death of dentists.

About 95 per cent of all dentists are men of the white race; therefore, this study includes data only on the 3,576 white male dentists whose death certificates were received. This provides a homogeneous group the statistics of which can be compared, meaningfully, with mortality statistics of the general white male population over 24 years of age.

Death certificates were received from 44 different state departments of health during the four-year period. Not all of these states, however, submitted death certificates during the entire period. Since there is variation in death rates of the general population according to region or state, a question arises as to the geographical representativeness of these mortality data.

Table 1 shows the regional distribution of the deceased dentists compared with that of living dentists in 1954. Although the correspondence between these two distributions is not perfect, it is believed to be close enough so that statistics of this study can be considered to represent the entire United States. Changes

Table 1 • Percentage distribution of 3,576 deceased dentists included in this study and percentage distribution of dentists in 1954, according to region

Region	Deceased dentists	Dentists, 1954
New England	9.8	7.3
Middle East	22.6	29.9
Southeast	12.2	12.1
Southwest	4.5	4.7
Central	38.1	28.3
Northwest	6.1	5.2
Far West	6.7	12.5
Total	100.0	100.0

Table 2 • Age and cause of death of 3,576 white male dentists who died during 1951-1954

Cause of death	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100-	Total	Per cent
Diseases of circulatory system	1	5	11	29	71	162	256	254	266	277	302	213	88	25	2	1	1,963	54.89
Rheumatic fever					1			1									2	.06
Diseases of the heart	1	5	11	28	67	153	244	242	252	254	266	185	74	19	1	1	1,803	50.42
Chronic rheumatic heart disease		2		1	2	2	7	5	10	4	8		1				42	1.17
Arteriosclerotic heart disease		3	10	24	58	129	204	207	204	192	208	133	51	13	1	1	1,438	40.22
Arteriosclerotic heart disease, so described		1	2	3	5	12	33	43	48	46	70	52	23	6	1		345	9.65
Heart disease specified as involving coronary arteries		2	8	21	53	115	171	164	156	145	138	81	27	7		1	1,089	30.46
Angina pectoris without mention of coronary disease						2				1			1				4	.11
Chronic endocarditis not specified as rheumatic					1	3	3		3	6	1	3	2				22	.62
Other myocardial degeneration				1	2	7	7	10	9	22	17	24	15	3			117	3.27
Other diseases of the heart	1			1	3	3	8	8	11	7	10	5					57	1.59
Hypertension with heart disease			1	1	1	9	15	12	15	23	22	20	5	3			127	3.55
Hypertension without mention of heart					2	2	6	2	4	8	7	7	3	1			42	1.17
Diseases of the arteries				1	1	6	5	7	7	15	26	17	11	5	1		102	2.85
General arteriosclerosis						1	1		4	10	23	16	11	5	1		72	2.01
Other				1	1	5	4	7	3	5	3	1					30	.84
Diseases of the veins and other diseases of the circulatory system						1	1	2	3		3	4					14	.39
Neoplasms	4	3	5	11	27	44	64	76	78	103	95	40	27	3			580	16.22
Malignant neoplasms including neoplasms of lymphatic and hematopoietic tissues	4	3	5	10	27	43	62	74	78	103	95	40	27	3			574	16.05
Digestive organs and peritoneum	2		1	3	6	15	24	33	32	45	40	17	12	2			232	6.48
Respiratory system			1		5	5	10	20	18	19	12	3	1				94	2.63
Genital organs						1	3	4	11	12	19	10	9	1			70	1.96
Urinary organs				1	2	2	6	7	5	5	7	3	1				39	1.09
Other and unspecified sites		2	2	3	8	12	8	3	4	14	11	5	1				73	2.04
Leukemia and aleukemia				2	2	1	5	3	3	4	2	1	2				25	0.70
Lymphosarcoma and other neoplasms of lymphatic and hematopoietic tissues	2	1	1	1	4	7	6	4	5	4	4	1	1				41	1.15
Benign and unspecified				1		1	2	2									6	.17
Diseases of the nervous system and sense organs	1	2	1	7	8	15	26	43	45	57	82	53	26	6			372	10.40
Vascular lesions affecting central nervous system	1	1	1	5	8	14	22	39	39	53	76	47	25	6			337	9.42
Cerebral hemorrhage			1	4	7	8	15	25	29	32	55	30	11	4			221	6.18

Cerebral embolism and thrombosis					1	1	3	11	6	12	15	9	12	2			72	2.01
Other vascular lesions	1	1		1		5	4	3	4	9	6	8	2				44	1.23
Other diseases of the nervous system and sense organs		1		2		1	4	4	6	4	6	6	1				35	.98
Accidents, poisonings and violence	4	5	11	12	13	17	21	22	15	16	22	9	6	6			179	5.01
Accidents	4	1	7	6	6	5	8	9	8	12	20	7	5	6			104	2.91
Motor vehicle accidents	3	1	4	4	3	3	3	3	5	4	5	3	1	2			44	1.23
Accidental falls				1	1		2	1	2	5	12	3	4	4			35	.98
Other accidents	1		3	1	2	2	3	5	1	3	3	1					25	.70
Suicide		3	4	6	7	12	12	13	7	4	2	2	1				73	2.04
Homicide		1					1										2	.06
Diseases of the digestive system			4	6	9	14	17	20	12	18	14	9	7		1		131	3.66
Cirrhosis of the liver			1	6	4	5	11	10	5	5	2	2					51	1.42
Other			3		5	9	6	10	7	13	12	7	7		1		80	2.24
Diseases of the respiratory system		1	1	1		5	8	10	10	13	23	12	8	6			98	2.74
Pneumonia			1	1		4	3	2	4	7	15	11	6	6			60	1.68
Other		1				1	5	8	6	6	8	1	2				38	1.06
Diseases of the genito-urinary system		1	2	1	5	2	4	9	7	10	16	15	6	3			81	2.27
Nephritis and nephrosis		1	2	1	5	1	3	4	3	8	6	2	1				37	1.04
Other						1	1	5	4	2	10	13	5	3			44	1.23
Allergic, endocrine system, metabolic, and nutritional diseases				1	4	2	4	8	9	13	16	7	3	1			68	1.90
Diabetes mellitus					4	2	4	6	8	12	13	6	3				58	1.62
Other				1				2	1	1	3	1		1			10	.28
Infective and parasitic diseases		3			2	2	4	10	4	7	5	1	1				39	1.09
Tuberculosis, all forms					1		1	6	3	4	3	1					19	.53
Other		3			1	2	3	4	1	3	2		1				20	.56
Symptoms, senility, and ill-defined conditions		1			3	1	2	6	1	3	4	3	4	4			32	.90
Mental, psychoneurotic and personality disorders				1			5			1	2	1					10	.28
Diseases of the blood and blood forming organs			1			1		1	3		2						8	.22
Diseases of the bones and organs of movement								1	1	1	2	2					7	.20
Congenital malformations					1	2		1		1							5	.14
Diseases of the skin and cellular tissue				1					1			1					3	.08
Total	10	21	36	70	143	267	411	461	452	520	585	366	176	54	3	1	3,576	
Per cent	.28	.59	1.01	1.96	4.00	7.47	11.49	12.89	12.64	14.54	16.36	10.23	4.92	1.51	.08	.03		100.00

Source: Copies of death certificates of dentists received from 44 state departments of health. Mean age at death: 67.5. Median age at death: 68.6.

Table 3 • Mean age at death according to cause of death

Cause of death	Mean age at death		
	Dentists	Dentists, age-adjusted	White male pop. over 24
Diseases of circulatory system	67.6	69.1	68.0
Neoplasms	66.6	67.7	65.2
Diseases of nervous system and sense organs	70.8	72.1	70.6
Accidents, poisonings and violence	60.9	61.8	53.4
Diseases of digestive system	64.0	65.4	61.6
Diseases of respiratory system	72.0	74.2	67.9
Diseases of genito-urinary system	70.6	72.3	69.2
Allergic, endocrine system, metabolic, and nutritional diseases	69.9	71.0	65.6
Infective and parasitic diseases	63.3	64.4	57.7
Symptoms, senility and ill-defined conditions	70.8	74.6	69.0
Mental, psychoneurotic and personality disorders	63.5	63.9	55.3
Diseases of blood and blood-forming organs	63.3	63.0	68.2
Diseases of bones and organs of movement	74.1	74.3	64.4
Congenital malformations	57.0	57.4	49.0
Diseases of skin and cellular tissue	63.7	62.7	64.8
All causes	67.5	68.9	66.1

in statistics on age and cause of death that would result from adjusting the geographic distribution of deceased dentists to conform with that of living dentists would be very minor.

Causes of death were classified in accordance with the *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death (Sixth Revision)*, published by the World Health Organization. Generally, subclassifications accounting for more than 1.00 per cent of the deaths are listed in Table 2. In certain special instances, causes of death accounting for less than this percentage are also listed.

A cause of death is the morbid condition or disease process, abnormality, injury or poisoning leading directly or indirectly to death. It is the underlying cause of death that is classified, and this is defined as (a) the disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury.[1]

Of the 15 major cause-of-death classifications, "diseases of the circulatory system" accounted for many more deaths of dentists than any other disease (Table 2). Diseases of the circulatory system accounted for 54.89 per cent of the dentists' deaths, more than three times as many as the second-ranking cause, neoplasms. The breakdown of diseases of the circulatory system shows that 50.42 per cent of all deaths were from diseases of the heart, with arteriosclerotic heart disease accounting for 40.22 per cent of all deaths, or about 80 per cent of all deaths from heart disease. A total of 30.46 per cent of all deaths was from heart disease specified as involving coronary arteries (about 60 per cent of all deaths from heart disease). The mean age at death for dentists dying from diseases of the circulatory system was about the same as the mean age for all causes combined (Table 3).

Neoplasms were the cause of 16.22 per cent of the deaths. Cancer of the digestive organs and peritoneum was more common than cancer of any other site

1. U. S. Department of Health, Education and Welfare, National Office of Vital Statistics. Vital statistics instruction manual, part II, cause of death coding. Washington, D.C. Government Printing Office, 1955.

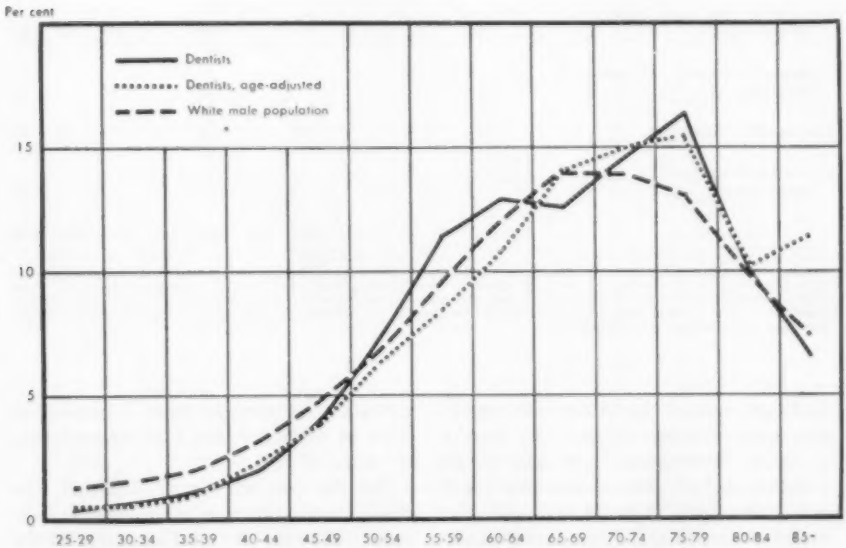
of the body, accounting for 6.48 per cent of all deaths, or about 40 per cent of all deaths from neoplasms. Mean age at death for cancer victims was nearly the same as the over-all mean, although there was considerable variation according to the site of the cancer.

Diseases of the nervous system and sense organs ranked third, causing 10.40 per cent of the deaths. Of the subclassifications of this category, cerebral hemorrhage claimed the most lives. Dentists dying from diseases of the nervous system and sense organs averaged 70.8 years of age compared to the general average of 67.5.

Of the 3,576 deceased dentists included in this study, 73, or 2.04 per cent, committed suicide, and two were murdered. Accidents were responsible for the deaths of 2.91 per cent of the dentists, automobile accidents accounting for 1.23 per cent. It is interesting to note that non-automobile accidents caused about one third more deaths than automobile accidents.

The average age of dentists who died from accidents, poisonings and violence was 60.9. Surprisingly, 64.5 was the average age at death resulting from accidents. Since the mean age of living dentists is less than 50, it is apparent that older dentists are more susceptible to fatal accidents than younger dentists.

The distribution of deceased dentists by age and cause of death is presented on an adjusted basis in Table 4 to allow valid comparisons with similar data for the general white male population over 24 years of age. The adjustment was made by calculating the proportionate difference in the age distribution of living dentists and that of the white male population. Thus, a factor was obtained for each age group and the number of dentists dying in each age group was multiplied by this factor. For example, 8.79 per cent of the living dentists and



Percentage of deaths occurring at specified ages, for dentists and the white male population over 24 years of age

Table 4 • Age-adjusted per cent of white male dentists, and per cent of white

Cause of death	25-29		30-34		35-39		40-44		45-49		50-54	
	Den-tists	Pop.	Den-tists	Pop.	Den-tists	Pop.	Den-tists	Pop.	Den-tists	Pop.	Den-tists	Pop.
Diseases of the circulatory system	.04	.11	.13	.24	.35	.55	.96	1.19	1.91	2.05	3.81	3.18
Neoplasms	.16	.13	.08	.17	.16	.24	.36	.43	.73	.73	1.03	1.15
Diseases of the nervous system and sense organs	.04	.06	.05	.07	.03	.10	.23	.18	.21	.19	.35	.46
Accidents, poisonings and violence	.16	.79	.13	.70	.35	.70	.40	.71	.35	.70	.40	.70
Diseases of the digestive system		.04		.07	.13	.14	.20	.24	.24	.34	.33	.41
Diseases of the respiratory system		.03	.03	.04	.03	.06	.03	.10		.16	.12	.22
Diseases of the genito-urinary system		.04	.03	.05	.06	.05	.03	.07	.13	.10	.05	.13
Allergic, endocrine system, metabolic and nutritional diseases		.02		.03		.04	.03	.06	.11	.08	.05	.13
Infective and parasitic diseases		.09	.08	.10		.12		.16	.05	.22	.05	.28
Symptoms, senility and ill-defined conditions		.01	.03	.02		.02		.04	.08	.05	.02	.07
Mental, psychoneurotic and personality disorders		.01		.02		.03	.03	.04		.05		.05
Diseases of the blood and blood-forming organs		–		–	.03	.01		.01		.01	.02	.02
Diseases of the bones and organs of movement		–		–		–		.01		.01		.02
Congenital malformations		.01		.01		.02		.02	.03	.02	.05	.02
Diseases of the skin and cellular tissue		–		–		–	.03	–		–		.01
Total	.41	1.34	.53	1.52	1.15	2.08	2.31	3.26	3.84	4.81	6.28	6.85

Note: "Age-adjusted" means that differences in the age distribution of living dentists and white male population have been taken into account. Percentages given in this table are not the actual percentages calculated from death certificate data but the percentages that would have obtained were the age distribution of living dentists identical to that of the white male population. Detail will not necessarily add to total because of rounding. Less than .005 per cent is indicated by —.

12.92 per cent of the white male population over 24 were in the age bracket 25 to 29. Dividing 12.92 by 8.79 yielded a factor of 1.47. The number of deaths of dentists aged 25 to 29 was multiplied by 1.47 to arrive at the estimated number of dentists in that age category who would have died had the percentage age distribution of dentists been identical to that of the white male population over 24 years of age.

In the preparation of Table 4, the latest available age distributions were used: 1954 for the dentists and 1952 for the population. The percentages of the white male population dying, according

male population over 24, dying at specified ages from specified causes

55-59		60-64		65-69		70-74		75-79		80-84		85-		Total	
Dentists	Pop.	Dentists	Pop.	Dentists	Pop.	Dentists	Pop.	Dentists	Pop.	Dentists	Pop.	Dentists	Pop.	Dentists	Pop.
5.23	4.70	5.90	5.98	8.26	7.00	8.06	7.04	7.94	6.71	6.02	5.26	5.68	4.14	54.29	48.15
1.31	1.78	1.76	2.28	2.42	2.55	3.00	2.32	2.50	1.90	1.13	1.20	1.47	.65	16.11	15.53
.53	.75	1.00	1.10	1.40	1.58	1.66	1.86	2.16	1.99	1.50	1.62	1.57	1.15	10.73	11.21
.43	.70	.51	.69	.47	.65	.47	.54	58	.47	.25	.37	.59	.32	5.09	8.04
.35	.52	.46	.53	.37	.56	.52	.48	.37	.37	.25	.23	.39	.15	3.61	4.08
.16	.31	.23	.42	.31	.46	.38	.46	.61	.47	.34	.40	69	.40	2.93	3.53
.08	.17	.21	.23	.22	.33	.29	.40	.42	.45	.42	.39	.44	.33	2.38	2.74
.08	.20	.19	.29	.28	.36	.38	.33	.42	.28	.20	.16	.20	.08	1.94	2.06
.08	.32	.23	.36	.12	.33	20	.25	.13	.16	.03	.07	.05	.04	1.02	2.50
.04	.08	.14	.10	.03	.12	.09	.12	11	.13	.08	.13	40	.18	1.02	1.07
.10	.04		.03		.03	.03	.02	.05	.02	.03	.02		.02	.24	.38
	.02	.02	.03	.09	.04		.05	.05	.05		04		.02	.21	.30
	.02	.02	.02	.03	.02	.03	.02	.05	.02	.06	.02		.01	.19	.17
	.01	.02	.01		.01	.03	.01		.01		–		–	.13	.15
	.01		.01	.03	.01		.01		.01	.03	.01		–	.09	.07
8.39	9.63	10.71	12.08	14.04	14.05	15.13	13.91	15.39	13.04	10.34	9.92	11.46	7.49	100.00	100.00

Source: Basic data on deceased dentists were obtained from copies of death certificates received from 44 state departments of health covering years 1951-1954. The age distribution of dentists was determined from a sample of the Association's file of all dentists as of mid-1954. Data on deaths of white males over 24 were taken from Vital Statistics of the U.S., 1952, Vol. II, Table 50, U.S. Dept. of Health, Education and Welfare. Estimates of the age distribution of the white male population as of July 1, 1952 were taken from Current Population Reports, Population Estimates, Series P-25, No. 121, Sept. 27, 1955, Table 3, U. S. Department of Commerce.

to age and cause of death, were calculated from vital statistics data of 1952, in which year there were 673,120 deaths among white men over 24 years of age.

The age-adjusted mean age at death for white male dentists was 68.9, compared to 66.1 for the white male population over 24. Since the standard error of the difference between the two means is only .24, the difference does not result from sampling error and is statistically significant. Dentists live longer than nondentists. This is shown graphically in the illustration.

Although the age-adjusted percentage of dentists (54.29 per cent) dying from

diseases of the circulatory system was significantly higher than the percentage of white men over 24 (48.15), for all age groups under age 50 the opposite situation prevailed, and fewer of the dentists than of the white men died from circulatory diseases. Beginning at age 50, the percentage of dentists dying from circulatory diseases was considerably higher than that of the white male population. The percentage of dentists dying from neoplasms tended to be lower than that of the population up to age 70, although the difference in percentages for all age groups combined is not statistically significant.

The percentage of dentists dying from accidents, poisonings and violence (5.09 per cent) was significantly lower than the percentage of the comparable general population group (8.04 per cent). Consistent with this fact is the difference in mean age at death from these causes, 61.8 for dentists compared to 53.4 for the population. However, one of the subclassifications of this category, suicide, claimed the lives of 1.91 per cent of the dentists (age-adjusted) against only 1.63 per cent of the population. Dentists experienced a much lower accidental death rate—3.12 per cent of the dentists compared to 6.09 per cent of the population. The comparative figures for deaths from automobile accidents were 1.33 per cent for dentists and 2.52 per cent for the white male population.

In this study it has not been possible to develop death rates *per se*. The total number of deaths of dentists during the period is not known because death certificates were not received from all states. The fact that the average age at death among dentists (age-adjusted) is higher than that of the white male population indicates that the number of deaths per thousand living dentists is less than the number of deaths per thousand population of similar age. The data available at this time, however, do not permit accurate calculation of the number of deaths per thousand dentists.

B. Duane Moen, Director

COUNCIL ON DENTAL EDUCATION

Dental and dental hygiene students: their characteristics, finances and practice plans. II. Characteristics of dental students

Dental students, no less than others, have felt the impact of recent social and economic change. As a result, the "typical" dental student of pre-war days is now in a minority in many colleges. Prior to World War II, dental students were commonly pictured as young, unmarried men, still living under the parental roof if school locations permitted, but more than likely "away at school" living in dormitories and rooming houses and relying principally on funds from home to finance their education.

This picture began to give way early

This is Chapter 2 of a report on a cooperative study made by the Council on Dental Education and the Division of Dental Resources of the United States Public Health Service.

Text of this report was prepared largely by Walter J. Pelton, D.D.S., M.S.P.H.; Quentin M. Smith, D.D.S.; Elliott H. Pennell; Ruth D. Bothwell, and James N. Ake, Washington, D.C.

in World War II, when potential students of just such "typical" character were diverted in number to service in the Armed Forces. Replacing them—and in many cases filling the new openings created when dental schools adopted accelerated programs—were older students, frequently men who had been out of school for some time who had recognized an otherwise unavailable opportunity to further their education. Their appearance on campus frequently meant the appearance of wives and children as well, for many had been married before entering dental school. Army and Navy training programs, together with the wartime trend toward early marriage, increased the number of married students even further. As a result, there developed among dental students a wide variety of living arrangements associated with new patterns of social life and family economy. Not only were large numbers of students drawing military pay and allowances but, in many instances, students' wives were working, thus providing more substantial family incomes and raising standards of student living. With veterans' benefits supplanting the educational programs of the Army and the Navy and with continued high levels of business activity creating ample job opportunities for married women, these wartime trends seemed to grow to even greater proportions during the postwar period.

Although the number of veterans is now declining, the present dental student body still differs markedly from its prewar counterpart. This chapter will describe the characteristics of students presently enrolled in dental school and indicate from what types of families they have been recruited. (To correct the underrepresentation of public schools in the Northeast and West, estimates which appear in this chapter were derived by weighting up the sample totals for each class to the appropriate total enrollment shown for each type of school and region in the 1954 Dental Students' Register.)

Table 4 • Average age of dental students projected to year of graduation, by class*

Class	Presumed year of graduation	Mean age at graduation
Senior	1954	27.6
Junior	1955	27.1
Sophomore	1956	27.0
Freshman	1957	26.8

*Since the collection of data for this study took place in the late spring of 1954, the ages reported by students have been considered as representing age as of the end of that school year.

PERSONAL CHARACTERISTICS

Age at Graduation • The average age of dental students is gradually declining, but the present body of dental students will still be somewhat older at graduation than were classes which entered school prior to the influx of veterans at the end of World War II. Data obtained in the present study show an average age at graduation of 27.6 years for students graduating in 1954, with a gradual decline to 26.8 years for the class of 1957 (Table 4). Information from the American Dental Association for years prior to the study indicates that a fairly steady decline in average age has been in progress since 1950. In that year, the average age at graduation reached a high of 29.1 years. This figure represented only a slight advance from 1949 when the first class containing significant numbers of veterans was graduated, but it was well above the average of from 25 to 26 years which prevailed for all classes finishing school between 1940 and 1948. Actually, the stability during the war and immediate postwar period serves to mask some pronounced changes in the age distribution of students observable in nearly every school during those years. Apparently, any effect on average age created when older students were admitted under wartime recruitment programs was offset by the acceleration in training (in both dental and predental schools) which permitted many students to graduate earlier and therefore younger than they would have otherwise.

Table 5 • Distribution of dental students by age projected to year of graduation, by class

Age at graduation	Presumed year of graduation (per cent)			
	1954	1955	1956	1957
All ages	100.0	100.0	100.0	100.0
21	0.1	0.0	0.1	0.0
22	0.8	1.2	0.8	1.1
23	7.6	10.9	10.5	11.1
24	13.7	16.3	18.9	23.2
25	14.0	19.1	21.2	19.9
26	14.1	12.4	11.7	11.9
27	13.0	10.6	8.0	6.5
28	9.1	8.3	6.9	6.1
29	7.1	5.3	5.7	5.4
30	5.7	4.0	3.5	4.0
31	4.3	3.1	3.6	2.3
32	3.5	2.7	2.7	2.4
33	2.0	2.1	1.6	1.4
34	1.9	1.4	1.6	1.4
35 and older	3.1	2.6	3.2	3.3

The changing composition of the dental student body at the present time is shown more clearly perhaps in a comparison of the age distributions of the four classes enrolled in school at the time of this study. The age distribution for 1954 graduates and corresponding projections for those who will presumably graduate in the following three years are shown in Table 5. Graduates under 25 years of age increase from 22 per cent to 35 per cent between 1954 and 1957. On the other hand, those graduating at ages 25 to 29 decline from 57 per cent in 1954 to 50 per cent in 1957, and those graduating at 30 years or later fall from 21 per cent to 15 per cent (Fig. 1).

Ages at graduation for students attending dental schools in different geographic regions are presented as averages in Table 6. For each class in school, average age at graduation is lowest for students in the Northeast, becoming progressively greater for those in the North Central, Southern and Western regions in the order named. Although the level varies from region to region, there is evidence over the period covered of a decline of approximately one full year in the average age at graduation for all regions except the West. In that region there is no consistent trend and, contrary to the pattern elsewhere, the average age at graduation in 1957 is actually slightly greater than in 1954. No appreciable differences were observed in any region between the ages at graduation for students in public and in private schools.

Veterans' Status • The steady downtrend in age observable among succeeding classes of students is largely attributable to a decrease in the number of veterans attending dental school. Veterans represented 38 per cent of all students in dental school at the time of the study, but the proportion of veterans declined precipitously over the period covered by matriculation of the four classes (Fig. 2). The high value of 58 per cent among senior students is progressively diminished to 26 per cent for freshmen. This decline is evident for students in both public and private schools and in all geographic regions of the country. As might be expected, variation from one region to another in the proportion of dental students who were veterans followed the same pattern as that shown for average age at graduation. In the Northeastern states, where average age at graduation was lowest, only 28 per cent of the students were veterans. In contrast, veterans represented 51 per cent of those attending schools in the West where

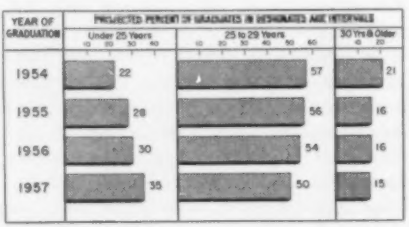


Fig. 1 • Per cent of dental students in selected age intervals, by year of graduation

average age was highest. In the North Central and Southern states, the proportions were 35 and 41 per cent, respectively.

Average age at graduation for veterans is actually several years greater than for nonveterans. Senior student-veterans averaged 29.3 years of age as contrasted with 25.3 years for nonveterans, a difference of four full years (Fig. 3). The average age at graduation for veterans progressively increases to 30.8 years for those presumably graduating in 1957, while for nonveterans the average is about the same for all classes in school, indicating that little or no change took place in the age patterns of those recruited from this group. In fact, the age of nonveterans at graduation closely approximates the mean age of 25.6 years recorded for all students graduating during the ten years preceding World War II.[2] These findings underscore the suggestion previously made that the presently elevated mean age for dental school graduates (27.6 years) is accountable in great measure to the high age level of the large number of veterans now attending dental school.

Marital Status • About 44 per cent of all students attending dental schools at the time of the study were married, and of these, almost half had one or more children (Table 7). As might be expected, the proportion of married students is lowest in the freshman year (31 per cent) and increases progressively in the higher classes, reaching its highest value (63 per cent) in the senior year. The proportion of married students varies by region from a low of 32 per cent in Northeastern schools to a high of 60 per cent for those in the West, with schools in the North Central and Southern regions having intermediate proportions of about 44 per cent and 48 per cent, respectively. Although minor differences appear, the per cent of students married in each geographic region is essentially the same for both public and private schools. In each of these categories the proportion of married students with children approximates one half.

Since marital status is so closely associated with age, it is not surprising that relatively more veterans than nonveterans are married, and that, among those who are married, veterans are more likely to have children than are nonveterans. Even among freshmen, the proportion of

Table 6 • Average age of dental students projected to year of graduation, by class and region

Region	Presumed year of graduation			
	1954	1955	1956	1957
All students	27.6	27.1	27.0	26.8
Northeast	26.9	26.6	26.2	26.1
North Central	27.6	26.8	26.8	26.6
South	28.1	27.4	27.5	27.0
West	28.2	28.0	28.3	28.4

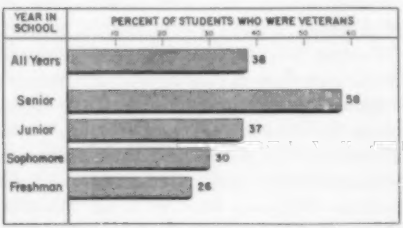


Fig. 2 • Per cent of dental students who were veterans, by class

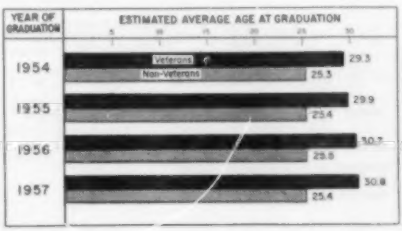


Fig. 3 • Average age at graduation of veterans and nonveterans, by year of graduation

Table 7 • Marital status of dental students, by class

Marital status	Per cent distribution				
	All classes	Freshman	Sophomore	Junior	Senior
All students	100.0	100.0	100.0	100.0	100.0
Single	55.6	69.1	63.1	52.4	37.2
Married	44.4	30.9	36.9	47.6	62.8
With children	21.4	14.4	17.0	21.9	32.5
Without children	23.0	16.5	19.9	25.7	30.3

veterans married exceeds two thirds, and in the senior class, 3 in every 4 veterans are married (Fig. 4). Fairly large numbers of nonveterans are also married, although in all classes the proportion married is appreciably less than for veterans. Among freshmen, about 1 in 5 nonveterans is married, with this proportion rising to about 1 in 3 by the junior year and, for those about to graduate, to approximately 1 in every 2. Probably because they have not been married so long, only about one third of the nonveterans have one or more children, as compared with three fifths of the veterans.

Living Arrangements • The most frequent living arrangements reported by students attending dental schools in 1954 represented the establishment of an independent home life in a house or apartment rented or owned by the students. Nearly half of all students classified themselves in this category. Those residing in rooming houses represented 19 per cent of the total, while another 18 per cent lived with their parents. Residence clubs and fraternities provided accommodations for 10 per cent. Only 6 per cent reported other living accommodations, including room and board in private homes or boarding houses (Table 8).

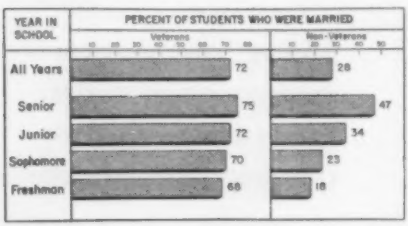


Fig. 4 • Per cent of veterans and nonveterans who were married, by class

The distributions of students by living arrangements are noticeably different for the four classes in school, but much of the apparent trend with years in school is attributable to the change from a group which is predominantly single in the freshman year to one in which a large majority are married in the senior year (Fig. 5). In fact, except for some minor adjustments in living arrangements which occur among single students between the freshman and sophomore years, the living arrangements of both single and married students remain substantially the same for all classes in school.

Students who have established a home in a house or apartment which they own or rent, for example, form an increasingly large proportion of successive classes, representing about one third of those in their freshman year but nearly two thirds of the senior class. For married students, however, the high proportion living in their own homes (about 7 in 8) remains essentially unchanged between the freshman and senior year and for single students, the proportion in their own homes changes only slightly (from about 1 in 8 among freshmen to 1 in 6 for those in later classes). Similarly, less than 1 in every 10 married students and about 1 in 4 single students live with their par-

Table 8 • Living arrangements of dental students, by class

Type of living arrangements	Per cent distribution				
	All students	Freshman	Sophomore	Junior	Senior
Total	100.0	100.0	100.0	100.0	100.0
Parent's home[1]	17.7	18.2	19.9	18.1	14.4
Own home	47.2	34.7	43.3	50.4	60.9
Rooming house	18.7	32.9	16.0	14.2	11.0
Boarding house	3.5	5.4	4.1	2.3	2.2
Club or fraternity	10.4	6.7	14.1	12.2	8.7
Other	2.5	2.1	2.6	2.8	2.8

1. Includes a small number of students living with other relatives or friends.

ents, and these proportions do not differ appreciably from one class to another. Only a negligible number of the married students, but more than half of the single students in each class have other types of living arrangements. A third of the single students reside in rooming houses, a sixth in residence clubs or fraternities, and a sprinkling are found in other types of accommodations. Residence in rooming houses looms somewhat larger in the freshman than in later years, when apparently many single students have either transferred to fraternities or residence clubs or set up housekeeping on their own.

Employment Status • Nearly one third of all dental students indicate that they worked at jobs outside of school hours during the week immediately preceding the survey (Table 9). This fraction is about the same as that recorded for all students of college age in a survey made by the Bureau of the Census earlier in the school year. (Unpublished data from the Census Bureau's Current Population Survey for October 1953 indicated that approximately 31 per cent of all persons 20 to 29 years enrolled in school were working. About 95 per cent of all students in that age group were attending college.)

In the present study, among dental students reporting employment, about 15 per cent worked fewer than 8 hours per week, 63 per cent worked from 8 to 23 hours, and the remaining 22 per cent worked 24 hours per week or more.

The highest proportion of students employed (44 per cent) was found in the North Central schools. The proportions for schools in all other regions were between 26 and 28 per cent. In the Southern and North Central regions, the proportions for public and private schools were essentially the same. In the West, however, only 19 per cent of students in public schools were employed, whereas in private schools the proportion working was 39 per cent.

Married students were somewhat more likely to have jobs than were single students, and veterans were more likely to be working than were nonveterans. About 32 per cent of the married nonveterans and 35 per cent of the married veterans

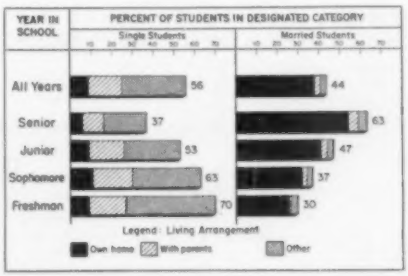


Fig. 5 • Per cent of dental students by marital status, living arrangements and class

Table 9 • Employment status of dental students, by hours worked and by marital and veteran status

Employment status	Per cent distribution				
	All students	Single		Married	
		Veteran	Nonveteran	Veteran	Nonveteran
Total	100.0	100.0	100.0	100.0	100.0
Working	30.7	31.9	27.4	34.8	32.1
Not working	69.3	68.1	72.6	65.2	67.9
Total working	100.0	100.0	100.0	100.0	100.0
Less than 4 hours	2.9	3.9	2.8	1.8	4.5
4 to 7 hours	11.6	8.6	15.3	9.2	9.2
8 to 11 hours	19.8	19.3	20.9	19.0	19.2
12 to 15 hours	20.9	19.6	23.9	17.2	21.2
16 to 23 hours	22.6	27.3	21.0	24.2	20.3
24 to 31 hours	12.9	13.0	9.5	15.7	15.6
32 to 39 hours	3.3	2.7	2.5	4.7	3.4
40 hours or more	6.0	5.6	4.1	8.2	6.6

had jobs, as compared with 27 per cent and 32 per cent, respectively, for single nonveterans and veterans. Similarly, married students with jobs tended to work somewhat longer hours than unmarried job-holders, and veterans longer hours than nonveterans. Among nonveterans, only about 16 per cent of the unmarried students worked 24 hours or more, but about 26 per cent of the married nonveterans worked this number of hours. For veterans, these percentages were increased to about 21 per cent for single students and 29 per cent for the married.

Predental Education • The proportion of dental students with minimal preprofessional college education has decreased considerably during the last 15 years, while the proportion with more advanced training has risen. In the present study, it was found that almost 47 per cent of all students had four years of college training before entering dental school, and another 9 per cent had previous graduate training. About 28 per cent had been accepted for enrollment with three years of undergraduate education and 17 per cent with only two years.

As a group, students who are single veterans have the highest level of preprofessional training, with about 75 per cent having four or more years of college education (Table 10). Married veterans are at only a slightly lower level with 67 per cent in this category. For nonveteran students, however, the amount of previous education completed is appreciably less, with only 56 per cent of the married students and 45 per cent of the single having

Table 10 • Predental college training of dental students, by veteran and marital status

Predental college training	Per cent distribution				
	All students	Veteran		Nonveteran	
		Single	Married	Single	Married
Total	100.0	100.0	100.0	100.0	100.0
2 years	16.4	7.9	10.9	22.9	13.5
3 years	27.8	17.4	22.4	32.3	30.6
4 years or more	55.8	74.7	66.7	44.8	55.9

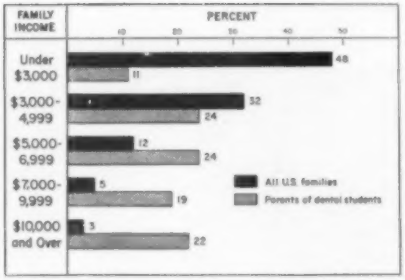


Fig. 6 • Distribution of parents of dental students, by income, and of all U.S. families, by income in 1950

four or more years of preprofessional training.

CHARACTERISTICS OF PARENTS

Income of Parents • The vast majority of dental students come from families which have far better than average incomes (Fig. 6). Only about one fifth of all families in the United States have annual incomes of $5,000 or more, but from this group come approximately two thirds of all dental students. Among the students in the study group who reported parents with incomes (about 88 per cent of the total), more than a fifth are from families with annual incomes of over $10,000, although this high income group represents only 3 per cent of all families in the country. In contrast, only a tenth come from families with incomes of less than $3,000, a group which constitutes almost half of the nation's families. The parents of dental students attending public schools have slightly higher incomes than those in private schools, but the difference is small.

A comparison of data for veterans and nonveterans suggests that student assistance programs may be decisive factors in many cases in determining whether qualified students from the low income groups participate in professional education, there being a relatively higher proportion of veterans from low income families enrolled in dental school than of nonveterans.

Education of Fathers • Dental students generally come from families in which the father has had considerably more schooling than have other men of roughly comparable age (Table 11). Only 25 per cent of all dental students' fathers had had no training beyond elementary school, whereas in the United States at large, 69 per cent of all men ages 45 to 64 have had this little schooling. At each higher level of educational attainment, the proportions for students' fathers are appreciably and consistently greater than for other men of comparable age. About 29 per cent of the students' fathers had completed four or more years of college, as compared with only about 5 per cent for all men between the ages of 45 to 64.

As in the case of parental income, fathers of veterans attending dental school have somewhat less representation in the higher levels of educational attainment than do fathers of nonveteran students.

Occupations of Fathers • One in every nine students in dental school at the time of the study came from a family in which the father was a dentist (Table 12). This ratio undoubtedly reflects a large measure of direct family influence in the dental

Table 11 • Educational attainment of fathers of dental students and of all men 45 to 64 years old

Highest grade of school completed	Per cent distribution	
	Students' fathers	All men 45 to 64 years old
Total	100.0	100.0
Completed elementary school or less	24.6	68.9
Attended high school but did not graduate	16.8	12.1
Completed high school	19.5	8.8
Attended college but did not graduate	10.6	4.8
Completed 4 or more years of college	28.5	5.4

Table 12 • Occupations of fathers of dental students and of all U. S. men 45 to 64 years old

Major occupation groups	Per cent distribution	
	Students' fathers	All men 45 to 64 years
Total	100.0	100.0
Professional workers	25.6	6.7
Dentists	10.6	0.2
Physicians	3.1	0.5
Teachers and school administrators	3.1	0.8
Other professional	8.8	5.2
Nonfarm proprietors, managers and officials	29.3	14.4
Sales workers	6.7	5.6
Construction and metal trades craftsmen	7.7	10.7
Farmers	6.0	12.8
Other occupations	24.7	49.8

student's choice of educational field, since only 1 in every 500 men between 45 and 64 years of age is a member of the profession. Other professional groups were also well represented among fathers of dental students. In all, about 26 per cent of the students' fathers were in one of the professions, as compared with 7 per cent of all men 45 to 64 years. Another 29 per cent of the students' fathers either operated their own businesses o were salaried managers or officials of some nonfarm enterprise; in the population at large, business executives are only about half so numerous. In nearly all other major occupational groupings, students' fathers are relatively less numerous than are other men.

CONCLUSION

The data presented here indicate that dental students, as a group, are now undergoing a transition from a pattern dominated by veterans to one which is essentially nonveteran in character. This phenomenon is especially important in interpreting the findings from the study because of its impact upon the composition of student bodies in future years.

The average veteran, for example, is four years older than the nonveteran, and partly as a result, he is far more likely to be married, to have children, and to have set up an independent household for himself and his dependents. Two thirds of the veterans are married and this proportion differs but little from class to class. In contrast, the proportion of nonveterans who are married is less than one fifth in the freshman year and builds up to about one half in the senior year. Consequently, as veterans now in school complete their training and new classes are recruited largely from nonveterans, the makeup of the dental student body will be substantially altered. This fact has important implications in planning to meet future demands for student housing and other student facilities and may have many subtle effects on financial planning in dental education. It should be kept in mind, however, that although the proportion of married students will continue to decline, it is likely to remain well above the pre-World War II level, perhaps at about the current figure for nonveterans. For this reason, schools probably should anticipate and plan for a relatively large segment of married students as a permanent feature of the dental student body.

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LON W. MORREY, D.D.S., EDITOR
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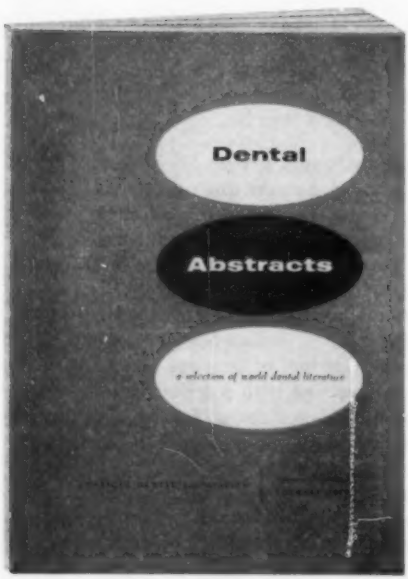
THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

A new journal with the New Year— Dental Abstracts opens new vista for dentistry



This month the Association's latest publication, *Dental Abstracts*, makes its debut in the field of dental literature. Number one, volume one of the new magazine will reach the mails on January 10 and reach most subscribers a few days later. Although it would be presumptuous to say that the world awaits *Dental Abstracts* with baited breath, it is not presumptuous to say that some 7,500 charter subscribers await the first number with more than casual interest.

It is hoped that the initial issue will be representative of the many issues to follow. Its sixty-four pages, seven and one-half by ten and three-eighths inches, contain more than a hundred short abstracts and nine slightly longer illustrated digests of current articles dealing directly or indirectly with the art and science of den-

tistry. The material represents a selection from original articles which appeared in more than 280 dental and other scientific magazines printed in 47 countries and 20 languages. It can truly be said, therefore, that *Dental Abstracts*' coverage is world wide in scope.

Dental Abstracts is the Association's answer to the hundreds of requests from busy, time-limited dentists who desire to keep abreast of developments in the profession. To this end, the physical make-up of the magazine has been designed by one of America's leading publication designers. It is printed by one of the largest printing houses in the United States and it is edited, it is believed, by one of the most competent dental editorial staffs in the world. Its contents are arranged under nine general headings which facilitate selective reading.

The body text is printed in nine point Caledonia type selected for its qualities of beauty and legibility. The main heads are printed in ten point Spartan, a sans-serif type face that is readily readable and undeniably attractive. The body stock is an English finish paper, selected because it absorbs rather than reflects the light—thereby reducing eyestrain and reading effort. The magazine is encased in a side-stitched cover of modern design. Little has been left undone to make *Dental Abstracts* worthy of its readers. The selection of the contents and the manner in which they are presented should please both eye and intellect.

Judging by the world-wide prepublication interest as well as by the contents and design of the January issue, *Dental Abstracts* is definitely going places. Dentists who wish to go with it are urged to subscribe now—the manner and price of subscribing are published on page A-58 of this issue.

Count your blessings

Three thousand Parisian dentists, it is reported by Reuter's News Service,[1] packed up their equipment on November 30, closed their office doors and went on strike for twenty-four hours in protest against the latest limitations imposed upon their practice by the French Social Security system. The extreme measures taken by the practitioners of Paris to register their objection to undue governmental pressures and interference is not unique to France. Last August, Austria's 15,000 physicians and dentists staged a two-day nation-wide strike[2] in protestation of the stringencies incorporated in the proposed new Austrian social health insurance laws—stringencies which not only involve the economics of the profession but the freedom of practice as well.

Currently, too, the dentists of Britain[3] are concerned with a serious issue—serious because it might well lead to an alarming attenuation of the profession. The British government is considering the enactment of a new dental law—one which already has passed its second reading in the House of Commons. One of the provisions of the bill—one objected to strongly by the dental profession—will permit specially trained auxiliaries to extract and fill the deciduous teeth of British children. Although the bill provides that these services shall be done only under the direction of a registered

dentist, the profession rightly is concerned lest the direct supervision of the services eventually will become as remote as the so-called direct supervision provided dental nurses in New Zealand by the school dentist who, in too many instances, is too many miles away.

These problems which confront dentistry abroad are cited merely for the purpose of reminding ourselves that we who live and practice in the United States have much to be thankful for. Unfortunately, we do have a few misanthropic members who cynically disparage their profession—men to whom the grass is always greener in other pastures, men who drag their feet and themselves and, in so doing, their occupation in the dust. Of course American dentistry has problems—but they are slight in comparison to problems facing the profession elsewhere. Of course many American dentists have problems but they, too, are slight in comparison to the problems of many of their confreres in many other so-called civilized countries.

Currently, a popular song—"Count Your Blessings"—is sweeping across the country. Every American dentist might rightly join in the chorus.

1. Chicago Tribune, Nov. 29, 1955.
2. Österreichische Ärzte Zeitung, Sept. 1955.
3. News from Britain, page 87 this issue.

Nation to observe annual Children's Dental Health Week, February fifth to eleventh

Scarcely a month remains before communities across the country will observe annual National Children's Dental Health Week. February fifth to the eleventh has been designated for that occasion—an occasion dedicated by the dental profession to the children of America and one designed to interest the parents of America in a year-round preventive dental program for their children.

Interest in this annual dental health project has grown so great and the program so extensive and varied that no longer does one day suffice for its observance. This year, and henceforth, a full week will be set aside for the occasion.

Now that the benefits of fluoridation have been demonstrated so conclusively, the promotion of water fluoridation and the topical application of fluoride to children's teeth have assumed a principal portion of the program. Information regarding fluoridation and other aspects of preventive dentistry and dentistry for children can be obtained from the Bureau of Dental Health Education and the Bureau of Public Information of the Association. Every dental society in every community should be well supplied with this valuable educational material.

If yours is one of the few dental societies that has not planned a program for this coming week of February fifth, it is not too late to do so. Write to the Bureau of Public Information of the Association, 222 East Superior Street, Chicago, Illinois, for a kit of educational material. Although time is short, your society can put some of the ideas into token use this year, and next year your community can join fully with the growing number of communities that observe this occasion annually.

Beverly Hills project suggests a practical method for making dental Relief Fund grow

A *Los Angeles Times* news story[1] of some two months ago concerning an activity of a group of civic minded Beverly Hills dentists deserves mention here. It deserves mention because the project which the Beverly Hills dentists carried through for the benefit of their community could be adopted, with slight modifications, by each of the Association's 430 component societies for the benefit of the Relief Fund and for those served by that Fund.

The Beverly Hills project was as simple as it was effective. Fifty-one dentists—Community Fund Volunteers—led by a chairman, called fellow members within the area for donations to the Red Feather Fund. They pledged themselves to raise five thousand dollars within the week.

The dentists of Beverly Hills are to be commended for their civic enterprise and spirit. Additionally, they are to be commended for sparking an idea which may be turned to advantage by the Council on Relief of the Association. If every component dental society would appoint a committee—large or small, depending on the size of the society—and if each member of that committee would remind a specified number of his fellow practitioners by phone or personal visit that a contribution of five dollars or more would be in order and appreciated, the Fund would soon grow to substantial proportions and more beneficiaries could be cared for more substantially. In most instances most dentists need only to be reminded that their assistance is needed, and a reminder to that effect from a fellow practitioner in most instances is appreciated.

As of December 15, contributions to the Relief Fund totaled $68,783.96, a trifle more than on the same date last year. Until a Beverly Hills committee is appointed in your society, let this notice serve as a reminder that your contribution to the Fund is needed now—and urgently.

1. Los Angeles Times, Oct. 11, 1955.

D.D.S. degrees conferred in 1955 constituted slightly less than 1 per cent of all earned degrees, according to a statistical compilation by the Federal Office of Education. In dentistry, according to the Office of Education, they totaled 3,099. Colleges and universities awarded 354,445 earned degrees altogether.

Bachelor level degrees in "dental science," as classified by the Office of Education, totaled 361. In the same category, an additional 116 degrees were awarded at the master's level.

Fifty-three applications for research grants were considered by the National Advisory Dental Research Council at its fall meeting several weeks ago. The number represented a new high mark for a fall session of the Council, which assembles three times yearly—usually in February, June and November.

The 53 requests for financial aid aggregated $422,154. The advisory group recommended approval of 25, totaling $166,996. It deferred action on eight others, which totaled $73,303. Final approval is expected to be announced in January by the U. S. Public Health Service.

Within the past month, the National Institute of Dental Research has hospitalized its first patients in the Clinical Center of the National Institutes of Health. Five beds are assigned to NIDR for clinical dental research. First patients were admitted to the 500-bed Clinical Center in July 1953, with cancer, heart and psychiatric patients predominating among subsequent admissions. Clinical dental investigations on an outpatient basis were started some time ago, but nearly two and a half years elapsed before the Clinical Center received its first dental inpatient.

A Department of Defense directive issued in December to effect joint and reciprocal utilization of military medical facilities makes particular reference to dental care. It emphasizes that the Army, Navy and Air Force are to assist each other in providing inpatient and outpatient dental care.

"Hospitalized personnel will be given authorized inpatient dental treatment," the directive states. "Personnel of one service assigned to duty with another service will be given outpatient treatment on the same basis as provided to personnel of the service rendering the service.

"Small units or detachments, located where dental facilities of their own service are not readily available or are uneconomical to establish, will be provided dental care by nearby dental facilities of other services.

"Isolated individuals and groups of military personnel will obtain dental care from civilian dentists, as authorized by the individual military department, when such procedures are more economical and efficient than sending patients long distances to military dental facilities, or requesting mobile dental units."

All full-time dentists, physicians and nurses at hospitals, field offices and research units of the Veterans Administration have been sternly reminded that they are not allowed to engage in outside professional activity for remuneration.

In essence, such an order has been in effect for several years, having been introduced by Vice Admiral Joel T. Boone when he was chief medical director. Now it has been reaffirmed by his successor, William S. Middleton, who has made certain clarifications which stress the rule's rigidity. The basis of the policy is that VA professional personnel, other than consultants and part-time doctors, are technically on duty 24 hours a day, seven days a week. Therefore, any outside

activity is interpreted as an infringement on government time.

Expressly forbidden is an outside dental practice. Beyond that, however, full-time VA dentists are enjoined from teaching, lecturing and other professional activities of whatever kind. Administering of emergency dental treatment, serving as a consultant, accepting awards—these are permitted on condition that no money is involved. Honoraria may be accepted, as for lectures, provided they are limited to actual expenses incurred.

It is understood that dental and medical schools presently having arrangements with VA personnel for part-time teaching services will have until the end of this academic year to make other plans. In instances where the individual concerned receives permission from the Department of Medicine and Surgery to continue with a teaching affiliation, there will be no interruption but he must agree to forfeit any claim for remuneration.

HEALTH LEGISLATION

The transmittal to Capitol Hill in January, soon after convening of the second session of the 84th Congress, of President Eisenhower's State of the Union Message will disclose what the Administration's intentions are with regard to national health legislation.

Washington is awaiting with anticipation the views of the White House on such issues as social security amendments, medical and dental benefits for servicemen's dependents, federal employees' health insurance, federal construction grants to medical and dental schools and numerous other matters which also concern dental practice.

The Senate Finance Committee will schedule public hearings soon on the House-passed social security amendment bill, whose provisions include one to extend compulsory coverage to dentists. The amending bill also authorizes permanent and total disability payments to beneficiaries aged 50 and over.

Early action also is expected from the House Ways and Means Committee on the Keogh-Jenkins bill amending the income tax laws to permit dentists and other professional people to receive tax deferment on a portion of their income diverted into pension plans.

International Correspondence

NEWS FROM THE REPUBLIC OF ARGENTINA

José Luis Romero has been named supervisor of the Universidad Nacional de Buenos Aires. Juan Chaneles, professor emeritus of therapy and hygiene, has been named supervisor of the Facultad de Odontologia de Buenos Aires. All the universities of the country and their respective colleges are hastening to the important task of reorganization which will undoubtedly require considerable time to complete.

At the last election the following were named to the board of directors of the Argentine Society of Dentistry for Children: Luis A. Bengochea, president; Hector L. Schweizer, vice-president; Octavio O. Maronna, secretary; Manuel D. Pujol, assistant secretary; Roberto S. Bado, treasurer; Juan P. Mengide, assistant treasurer; H. La Fuente, Orlando Pappalardo and Adolfo Pagani, voting members.

Ricardo Augusto Crespi,
correspondent from Buenos Aires

NEWS FROM GREAT BRITAIN

Sir Wilfred Fish writes that "at the Board of Faculty meeting of the Royal College of Surgeons on October 7th, Prof. Frank Wilkinson was unanimously re-elected Dean for a third term of office. Mr. Roper Hall, of Birmingham, was elected Vice-Dean. It was reported to the Board that the appeal for funds to equip and maintain a Department of Dental Science and Research was already nearing the halfway mark and that there were prospects that further help was likely to be forthcoming."

The autumn series of dental postgraduate lectures at the College has been arranged and began November 8.

The Dental Board met on November 7 for what might have been almost its last session.

The dentists' bill passed its second reading in the House of Commons on November 4 and now goes to committee. If it becomes law—as seems likely—the Board will be superseded by a General Dental Council, under which dentistry will become autonomous and the Dentists' Register finally freed from the last vestige of medical control. Election to the new Council would then take place early in 1956.

During the debate November 4 in the House of Commons on the second reading of the Dentists' Bill, some interesting observations were made. The following quotations may be of interest.

The Minister of Health, Mr. Iain Macleod, stated, "The Government suggest that we must look at the question of employment of ancillary workers, and we put forward two proposals in the Bill. The first of these, is, I think, generally welcomed and, therefore, I need say only a word or two about it. It is the suggestion about oral hygienists. They have been doing very valuable work. There are a few of them now, and I hope to see their numbers grow. It is suggested that they will be able to work under strict control in private practice. The words of the Bill are 'under the direct personal supervision of a registered dentist.'

"The proposal is that for a limited list of school children the dental ancillary worker—the word 'nurse' cannot be used for that is a protected title—will be able to extract milk teeth, which, apparently, are called deciduous teeth, and to carry out fillings, that this work will be done under the direction of a registered dentist and that the regulations for this class will be made by the General Dental Council.

"I think I have made clear that the Government regard this as a worthwhile experiment and have no intention of prejudging its success or failure. We have been very careful indeed to put the strictest controls that we can think of upon the regulations that are to be made for those Clauses of the Bill, and not only the General Dental Council but the Privy Council and both Houses of Parliament, are there brought into the picture. I believe, therefore, that the public interest will be fully safeguarded.

"I welcome very much the attitude that the British Dental Association has been taking towards this new Bill. The Association remains opposed—I should state this frankly—to the introduction of ancillaries, and it does not believe that the experiment will work, although I think that we ought to suspend judgment on both these matters."

The Parliamentary Secretary to the Ministry of Health, Miss P. Hornsby Smith, stated, "Clauses 18 to 20 spotlight the requirements of the public, and all the Clauses dealing with ancillaries are substantially based upon the great need of the public for additional dental services.

"We deplore the shortage of dentists, but we must be realistic in our approach to this matter.

"To my mind, the Clauses relating to ancillaries are clear cut. It is not a question, as some honorable Members would have us believe, of whether a child should be treated by a dentist or by a dental ancillary, but of whether the vast number of children should get any treatment at all.

"When I hear some criticisms of the experiment I would say to the British Dental Association that if it has so little faith in the ethical standards of its own profession as not to think that the Council will report honorably and fairly whether the experiment has succeeded or failed, then the profession has no right to be asking for autonomy. If, as I believe, the Dental Council will conduct the experiment fairly, ethically and efficiently, it has nothing to fear. If the experiment succeeds, the Council's duty is clear—to encourage the training and introduction of dental ancillaries. If the experiment fails the Council will so report to the Privy Council."

PUBLIC DENTAL SERVICE

Nottinghamshire County Council has published its annual report for 1954. The report is presented by Dr. Jeremiah, principal school

medical officer, who has some pertinent things to say about the School Medical Service in general and the Dental Service in particular. Dr. Jeremiah's report brings into focus the underlying reason why young physicians and dentists are reluctant to enter the Public Health Service.

He asks whether medical inspection under conditions of shortage of staff are a mere "rubber stamping" of what exists and consequently a waste of time. The importance of routine examination is the evaluation of the child as an individual and not as one of a crowd.

Early defects cannot be left to chance parental perception nor to the time-limiting congestion of overcrowded private surgeries. It is important for both parents and teachers to know that a child is free from defect. It follows that the future of the Service must be "not in a demission of the standards of work nor of the professional qualifications of those engaged in routine school inspection but in a broadening of their clinical responsibilities."

Therefore, a young physician must not only be told there is a career in the service, he must clearly see that the clinical responsibility and conditions of service, worthy of his long training, approximate the opportunities and rewards in other branches of medical service with whose members he will be working in close association. How closely and sadly, Dr. Jeremiah goes on to say, do parallel considerations continue to bedevil the School Dental Service.

An establishment which should be staffed at 22 still lacks 11. There are nine full-time and five part-time officers on the operating staff, and, Dr. Jeremiah says, in spite of the considerable volume of work done, much of the potential of the service is consumed in dealing with the "toothache" case and the septic mouth, those very casualties which are the direct consequence of the current lack of prevention.

The use of part-time officers has its own peculiar effects upon the work done. "An established team, Dental Officer and Attendant, working in a fixed clinic, in a prescribed area and with a known school population must be capable of a greater output than the 'team' constantly required to move around the County at the demands of emergency needs, and subject to repeated changes of working partners."

In amplifying his medical officer's survey and analysis, Mr. D. E. Mason, principal school dental officer of Nottingham County, reports on certain pleasing features which have brightened the picture somewhat; namely the establishment of a dental laboratory and, in the same premises in the center of Nottingham, a full-time orthodontic clinic. The school population of the County is approximately 85,000 children, and that figure alone serves to emphasize the difficulties which must confront the school health authorities.

During the year there were more than 8,000 applications for emergency treatment, and it must have been one of the main preoccupations of administration to arrange for their treatment. The private practitioner is not always in a position to render effective help even though free treatment is available from that source. Mr. Mason has something to say about the effect on production of the constant presence of the efficiently trained dental attendant.

Routine dental inspections numbered only some 32,000 children out of the total of 85,000. Of those inspected over 28,000 were found to have defective teeth and 23,000 were referred. Minor dental defects were not referred, a situation which only serves to underline the massive dental problem which the County has to face. The pressing urgency of treating major defects and limiting treatment in each case would seem to be the only policy available and is the one advocated by the Ministry of Education when the dental staff is numerically too small to give effective comprehensive treatment.

The appointment of a full-time orthodontist, the setting up and staffing of a laboratory, the employment of oral hygienists, the acquisition of mobile dental clinics, the institution of additional evening sessions, all serve to demonstrate the sincere wish of the Authority to render the full service which the law envisaged. It is to be hoped that in the words of Dr. Jeremiah they can be encouraged to "look forward to better days."

NATIONAL HEALTH SERVICE

Up-to-date figures on income of dentists are not easy to come by, but calculations made from statistical data compiled by the Management Committee of the Executive Councils' Association (England) for the year ended March 31, 1954, reveal that the average remuneration of the 8,771 principal and assistant dental practitioners in the National Health Service was £3,025 for the year. Assuming that 52 per cent of this figure represented practice expenses, it can be granted that the average remuneration of dentists is not unduly high. The all too common impression that dental fees reach fantastic levels ought to be dispelled by more publicity of the true facts from those engaged in the National Health Service whose opinions count with the public.

ITEMS OF INTEREST

The American Dental Society of London held its second dinner meeting of this session November 16, in the Great Hall, Royal College of Surgeons.

Paul Toller, F.D.S., R.C.S., England, gave an interesting lecture on temporomandibular joint authography. He described a technic in which the joint is injected with a radiopaque substance prior to the making of a roentgenogram.

Mr. V. W. Humpherson has been appointed chairman of the Dental Estimates Board to succeed the late Mr. W. Leslie Boness. His many friends both overseas and in Great Britain wish him success in this very responsible position.

Our congratulations to Sir William Kelsey Fry who, while on a tour to Canada and the United States, was invested with the honorary degree of Doctor of Science at McGill University.

We welcome back Mr. H. Parker Buchanan, secretary of the British Dental Association, from his recent visit to Canada and the United States. Herbert Buchanan said that perhaps his most immediate impression was the overwhelming cordiality, friendliness and hospitality which he encountered everywhere. His itinerary took him first to Canada, then to the United States, first to Chicago and then to San Francisco. The size of the American Dental Association meeting was astonishing by any European standard. He was throughout treated not only as a guest of honor but as an old and valued friend.

The Ministry of Health has published a six page leaflet of explanatory notes on the subject of fluoridation of public water supplies. The purpose of the leaflet is to provide information sufficiently nontechnical to be suitable for the dentist to use when answering the questions of the intelligent lay inquirer.

This is a well written, informative document and an excellent example of a complex subject briefly explained in simple, concise English. It should prove of considerable value to the busy practitioner.

The British Pharmacopaeia Commission has now recommended, and the General Medical Council has accepted, that the apothecaries' system should be discontinued in future official publications (*Pharmaceutical Journal*, October 15, 1955). It is hoped that editors of scientific and medical journals will in turn conform with this decision. Only by widespread official and authoritative action of this kind will the metric system finally oust the other, so that everyone thinks in metric terms, mistakes are averted and the comparison between articles written in British journals with those of other lands will not be so difficult where drug dosages are concerned.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

NEWS FROM THAILAND

The dental association of Thailand holds a social affair each year so that its members may meet for discussion of scientific matters and to raise funds for utilization in the promotion of dental hygiene of the public. Inasmuch as the membership is still small, the dental association this year joined with the medical, nurses' and pharmaceutical associations to sponsor the November 5 affair.

The affair was held at Lumphinee Park. This time the committee of the nurses' association officiated, and the committees of the other three associations assisted generally and took turns as master of ceremony.

New members of the Committee of the Thai Dental Association are Thavil Tandikul, president; Isra Yuktanandana, vice-president; Rith Boozayaankool, treasurer, and Police Captain Salang Srutisut, secretary.

Prof. See Sirisinha has been chosen to serve as dean of the School of Dentistry of the University of Medical Science, Bangkok, replacing Prof. Luang Vach Vidyavaddhana, who resigned September 5.

Dr. Sirisinha is a graduate of the School of Dentistry, University of Pennsylvania. He served in the Thai Army for a while. Since 1940 he has been lecturer at the Bangkok dental school. Now he is acting head of the prosthetic department and the School of Dental Hygiene.

C. Ratanaphaisal

Association Affairs

PLAN CONFERENCES ON TRAINING OF AUXILIARIES

The training of dental hygienists, assistants and laboratory technicians will be studied in a number of conferences and meetings scheduled for early 1956 by the Council on Dental Education, it was announced by Gerald D. Timmons, Council chairman. The Council met December 4 and 5 at the Central Office. March 5-7 the Council will sponsor, together with the Council on Dental Trade and Laboratory Relations, a workshop on the training of dental laboratory technicians. On February 6, it will meet with representatives of the American Dental Assistants Association to plan a conference on training programs for the assistants. The Council will meet also with the education committee of the American Dental Hygienists' Association to plan both an achievement testing and an aptitude testing program.

The achievement testing program for dental hygienists is expected to be placed in operation on a test basis in 1956-57. The achievement testing program will be designed to form the basis for a national board of examination in dental hygiene.

Other actions taken by the Council include the approval of internships and residencies at six additional hospitals, bringing the total of approved programs to 165; approval of the first two years of the dental school at the College of Medical Evangelists at Loma Linda, Calif. (the school enrolled its first freshman class in 1953), and the decision to establish an achievement testing program for students from abroad.

The achievement testing program will be designed to evaluate the student's dental training so that he may be properly placed in U.S. dental school programs. About 100 students from abroad are studying for the American D.D.S. degree this year.

Residencies and internships approved are:

VA hospital in Ann Arbor, Mich., residency in prosthodontics; Jewish Hospital in St. Louis, rotating internship; VA hospital in the Bronx, N. Y., residency in oral surgery; Western Pennsylvania Hospital in Pittsburgh, internship in oral surgery; Armed Forces Institute of Pathology, Walter Reed Army Medical Center, in Washington, D. C., residency in oral pathology, and U.S. Naval Hospital, St. Albans, Long Island, approval extended to the second year of the residency in oral surgery.

VOLUME ONE, NUMBER ONE OF DENTAL ABSTRACTS APPEARS

Dental Abstracts, the Association's latest publication, makes its debut this month. Volume one, number one of the new magazine will be in the hands of its 7,500 charter subscribers by mid-January. Its 64 pages contain more than 100 short abstracts and nine slightly longer illustrated digests.

The material in the magazine represents a selection from original articles which appeared in more than 280 dental and other scientific magazines printed in 47 countries and 20 languages. The abstracts are arranged under nine subject headings to facilitate selective reading.

In announcing the debut of the publication, Lon W. Morrey, Association editor, stated, "*Dental Abstracts* is the Association's answer to the hundreds of requests from busy, time-limited dentists

who desire to keep abreast of developments in the profession. To this end, the physical make-up of the magazine has been designed by one of America's leading publications designers. We have chosen a type face and a paper designed to make the magazine readily readable. *Dental Abstracts* is being printed by one of the largest printing houses in the United States. The selection of the contents and the manner in which they are presented should please both eye and intellect."

Subscriptions may be obtained from the Subscription Department at the Central Office. Domestic subscriptions are $6; others, $7.

LIBRARY USERS URGED TO ASK FOR BOOKS NOW

Persons who need books from the Association's Bureau of Library and Indexing Service have been asked to make requests for this material now as building alterations will cause some curtailment in library services during the latter part of February and March. Donald Washburn, Bureau director, explained that it will be necessary to store a large part of the library's collection during alterations.

QUESTION NEED TO TIGHTEN DISPENSING OF BARBITURATES

A Congressional committee was urged last month not to place "unreasonable obstacles" in the way of the dispensing and prescribing of barbiturates by dentists. In a statement filed with a House Ways and Means Subcommittee studying illicit traffic in narcotics and barbiturates, Paul E. Jones, chairman of the Association's Council on Legislation, said that the Association had discovered no evidence that the dispensing and prescribing of barbiturates by dentists has in any way contributed to the problem of dependency on the drugs.

"In many cases, it is in the patient's best interest for the dentist to administer or prescribe a barbiturate either preoperatively or postoperatively," he said. "The amount of barbiturate required by a dental patient is relatively small," Dr. Jones pointed out. More rigid controls are unwarranted and "might discourage dentists and physicians from dispensing and prescribing barbiturates where they are clearly indicated in the treatment process," he stated.

The American Medical Association and the Federal Bureau of Narcotics also have testified against stricter federal controls. The House committee is expected to have a report ready for Congress when it reconvenes in January.

RAYMOND BOWEN APPOINTED TO NBS RESEARCH STAFF

The appointment of Raymond Bowen of San Diego to the Research Fellowship at the National Bureau of Standards was announced January 1 by Harold Hillenbrand, Association secretary. Dr. Bowen received his D.D.S. degree from the School of Dentistry of the University of Southern California in 1953. Since graduation he has been taking advanced work in mathematics and chemistry. Dr. Bowen succeeds Robert J. Nelsen who has resigned to enter private practice.

COUNCIL ASKS SUGGESTIONS FOR SCIENTIFIC PROGRAM

Names of essayists and clinicians who might appear on the scientific program of the Association's 97th annual session in Atlantic City October 1-4 have been requested by the Council on Scientific Session. Charles S. Kurz, Council chairman, has announced that program planning for next October's meeting will begin when the Council meets January 23 and 24 in the Central Office. Dr. Kurz asks that persons with suggestions for

speakers forward their recommendations to the Council on Scientific Session at the Central Office in time for the meeting.

In addition, individuals or organizations who recently have produced films relating to dentistry which might be suitable for showing at the annual session are requested to write to the Association Film Library for film preview applications.

TECHNICIANS' TRAINING ON COUNCIL MEETING AGENDA

A report on the coming Association sponsored workshop for dental laboratory technicians and a report on the National Association of Dental Laboratories' certification and education program are two items on the agenda of the January 8 and 9 meeting of the Council on Dental Trade and Laboratory Relations at the Central Office. Walter E. Dundon, Council chairman, will preside.

Also to be considered by the Council members are the investigation of violations of the federal mail order denture law and a report on constituent society accreditation programs.

$68,783 IN; RELIEF FUND PASSES TWO THIRDS MARK

Contributions to the 1955-56 Relief Fund reached $68,783.96 December 15, more than 68 per cent of the way to the $100,000 campaign goal. Payments were running about the same as those of last year. As of December 13, the latest date for which a breakdown of contributions was available, seven constituent societies had paid 100 per cent or more of quota. They were: Alabama, Hawaii, Montana, Nevada, North Dakota, South Dakota and Tennessee. Tennessee headed the list with 255 per cent of quota paid in. The smaller societies took the lead away from the larger societies this month, contributing 69 per cent of their total to the 66 per cent paid in by the larger organizations. Contributions were as follows:

Quota of $1,000 or more

	Quota	Contributions to Dec. 13	Pct.
California	$ 3,770.00	$ 3,171.00	84.1
So. California	4,720.00	2,703.50	57.3
Connecticut	1,940.00	1,455.00	75.0
Florida	1,420.00	1,163.00	81.9
Georgia	1,070.00	493.00	46.1
Illinois	7,120.00	5,955.50	83.6
Indiana	2,270.00	1,877.93	82.7
Iowa	1,780.00	1,471.00	82.6
Kansas	1,000.00	822.30	82.2
Kentucky	1,160.00	401.00	34.6
Louisiana	1,020.00	688.50	67.5
Maryland	1,100.00	925.00	84.1
Massachusetts	3,660.00	1,149.50	31.4
Michigan	4,090.00	2,941.40	71.9
Minnesota	2,770.00	1,908.00	68.9
Missouri	2,420.00	1,572.00	65.0
Navy	1,050.00	390.00	37.1
Nebraska	1,000.00	348.00	34.8
New Jersey	4,010.00	2,742.00	68.4
New York	15,020.00	7,514.00	50.0
N. Carolina	1,300.00	570.00	43.9
Ohio	4,940.00	3,387.00	68.6
Oregon	1,270.00	1,059.00	83.4
Pennsylvania	6,790.00	3,660.00	53.9
Tennessee	1,360.00	3,469.00	255.1
Texas	3,240.00	1,618.50	50.0
Virginia	1,190.00	920.50	77.4
Washington	1,810.00	1,562.00	86.3
Wisconsin	2,950.00	1,773.50	60.1
Total	$87,240.00	$57,711.13	66.2

Quota under $1,000

	Quota	Contributions to Dec. 13	Pct.
Air Force	$ 540.00	$ 223.75	41.4
Alabama	820.00	945.00	115.2
Alaska	50.00	.....	....
Arizona	310.00	107.50	34.7
Arkansas	550.00	489.00	88.9
Army	520.00	183.50	35.3
Colorado	970.00	513.50	52.9
Delaware	150.00	117.00	78.0
Dist. of Col.	800.00	535.00	66.9
Hawaii	370.00	391.00	105.7
Idaho	290.00	94.00	32.4
Maine	460.00	295.50	64.2
Mississippi	540.00	334.00	61.9
Montana	360.00	424.50	117.9
Nevada	100.00	142.00	142.0
N. Hampshire	320.00	230.50	72.0

New Mexico . . .	250.00	228.00	91.2
North Dakota . .	320.00	404.05	126.3
Oklahoma	900.00	628.00	69.8
Panama C. Z. . .	20.00	. . . . .	. . .
P. H. Service . .	200.00	168.50	84.3
Puerto Rico . . .	240.00	93.25	38.9
Rhode Island . .	550.00	244.00	44.4
So. Carolina . . .	470.00	295.00	62.8
South Dakota . .	320.00	447.00	139.7
Utah	480.00	290.50	60.5
Vermont	190.00	112.00	59.0
Vet. Admin. . . .	770.00	251.50	32.7
W. Virginia . . .	740.00	502.00	67.8
Wyoming	160.00	120.00	75.0
Total	$12,760.00	$ 8,809.55	69.0

MARCH 31 IS DEADLINE ON ASSOCIATION DUES

The deadline for payment of Association dues for the year 1956 is March 31, Louis M. Cruttenden, assistant secretary, has announced. Dues must be remitted by the deadline, Dr. Cruttenden said, because Association sponsored insurance carried by the member may be affected if good standing is lost. Dr. Cruttenden also announced that June 30 is the date by which applications for life membership must be received in the Central Office.

COUNCIL SCORES LACK OF FUNDS FOR DENTAL RESEARCH

The lack of federal funds for dental research was scored by the Council on Dental Research at its December 1 and 2 meeting in Washington, D. C. Pointing out that dental disease now costs the American people a billion and a half dollars a year, the Council asserted that the solution would be found only through research aimed at the control and prevention of disease.

Trained research personnel is available in schools and research institutions, the Council stated, but the ability of these scientists is not being fully utilized because of the limited amounts of funds available for research grants. The Council urged that federal appropriations for research at the National Institute of Dental Research be greatly expanded.

In an additional action, the Council announced the publication in THE JOURNAL in early 1956 of a special article on high lights from the field of dental research during the past year. The summary, which will be an annual service of the Council, will include contributions, this time by nine leading researchers, and will be edited by J. Roy Blayney, a Council member. The Council also plans to publish a series of articles on various areas in dental research.

Thomas J. Hill, Council chairman, presided at the meeting.

1956 EDITION OF DIRECTORY READY JANUARY 1

The 1956 *American Dental Directory* lists the names and addresses of more than 90,000 dentists, according to an announcement by John J. Hollister, Association business manager. The *Directory*, available January 1, gives the dentist's Association membership status, character of practice and school and year of graduation. In many cases, it also gives his year of birth. In addition, the volume contains the names and addresses of the dental schools, the requirements of state dental examining boards, addresses of national dental organizations, list of specialists and other reference material of importance to members of the profession.

"The *Directory* is useful in many different ways," Mr. Hollister said in announcing the volume's publication. "It can be used to refer patients to qualified specialists, to send roentgenograms and other diagnostic data to dentists and to be certain of the correct address and to locate old friends and classmates."

The *Directory* may be obtained for $7.50 from the Order Department at the Central Office.

WIDE USE OF TV SEEN FOR DENTAL HEALTH WEEK

A television script and flipcards have been prepared by the Bureau of Public Information for use during National Children's Dental Health Week February 5-11. Reports from various parts of the country indicate that television will be used to a greater extent in the 1956 observance than ever before. As of mid-December some 3,200 kits of other promotional material and more than 188,000 posters had been mailed by the Bureau. A poster commemorating the week-long event has been prepared by the International Apple Association and may be obtained from the Apple Association, 1302 18th Street, N.W., Washington, D. C.

PATIENT EDUCATION CHART PREPARED BY ASSOCIATION

A new transvision chart in color for patient education has been produced by the Bureau of Dental Health Education.

By turning the pages of the new transvision chart prepared by the Bureau of Dental Health Education, the dentist can show the patient various dental conditions and what can be done about them.

The purpose of the chart is to help the dentist guide his patients to needed dental treatment. By turning the transparent acetate pages of the chart, the dentist can show the patient various dental conditions and what can be done about them. The size of the chart when open is 14½ x 14¾ inches. *Patient Education Illustrated,* priced at $3.50, may be obtained from the Order Department at the Central Office.

COUNCIL ISSUES 1956 ACCEPTED DENTAL REMEDIES

A statement on fluoride-containing dentifrices, a new section on molten metal sterilizers, other additions to the section on disinfection of dental instruments, revisions of the information on muscle relaxant drugs and general anesthetics are among some of the features of the 1956 edition of *Accepted Dental Remedies,* according to J. Roy Doty, secretary of the Council on Dental Therapeutics. In addition, the volume has been brought up-to-date in respect to the new listings in the U.S. Pharmacopeia and the National Formulary.

The publication contains the latest evaluations of some 800 dental drug products. Among the subjects covered are analgesics, sedatives and hypnotics, antibiotics and other anti-infectives, central nervous system stimulants, dentifrices and symptoms and treatment of acute poisoning. Copies may be obtained for $2 from the Order Department at the Central Office.

SUBSCRIPTS • Association president Bernerd C. Kingsbury has appointed Matthew Besdine of Brooklyn to the Council on Legislation. Dr. Besdine succeeds Joseph Glaser of New York, who resigned for reasons of health. . . . The *Principles of Ethics* of the Association, revised to October 1955, has been pub-

lished. . . . Reprints of the article "Bootleg Dentistry," which describes the hazards of patronizing illegally operating dental laboratories, are available from the Council on Dental Trade and Laboratory Relations. The article, first published in *Today's Health,* was commented on in the December 5 issue of *Time* magazine. . . . The German Dental Association has requested issues of *Dental Cosmos* for the years 1859-1862, 1864-1874 and 1894-1895. Persons with copies to donate are asked to contact Donald Washburn, director of the Bureau of Library and Indexing Service at the Central Office. . . . H. Trendley Dean, secretary of the Council on Dental Research, was chairman of the dentistry section of the AAAS meeting in Atlanta, Ga., December 28.

Dental Societies

SECOND CENTURY BEGINS FOR ST. LOUIS SOCIETY

A second century begins this year for the St. Louis Dental Society, which claims to be the first city society to become 100 years old. The start of its second century will be marked by a year-long program. The year has been divided into quarters, each with a theme, each theme to be carried through with a kick-off event and follow-up activities.

The society has chosen as first quarter theme "Care and Prevention." Activities will be geared to young children and their parents through education and promotion in homes and schools. Special events are planned for Children's Dental Health Week.

Other themes are: dentistry as a profession, aimed at young persons making career decisions; the dental profession as a whole, aimed at the general public, and the history and future of the society, aimed at members of the dental and allied professions.

During the third quarter, the St. Louis Dental Society will take part in the St. Louis Mid-America Jubilee, a month-long event sponsored by city, civic and commercial organizations. The fourth quarter will begin with the Centennial Mid-Continent Dental Congress November 25-28. Kick-off for the first quarter will be a dinner meeting January 9 at the Hotel Congress.

The society has adopted a centennial seal with the legend "Better Health Through Dentistry." Persons interested in becoming a centennial sponsor may contact James E. Brophy, 8013 Maryland Ave., St. Louis 5.

MICHIGAN, OLDEST STATE SOCIETY, TO MARK CENTENNIAL

Representatives from more than half the nation's state dental societies and distinguished guests from many parts of the country and several other nations are expected to attend the Centennial Convention of the Michigan State Dental Association. The Association will celebrate its 100th anniversary with a five day convention, April 15-19, 1956, at the Hotel Statler, Detroit.

The Association was officially organized in 1856 and thus in 1956 will be the first state dental society in the nation to have been in continuous existence for 100 years.

Two of the honored guests will be Bernerd C. Kingsbury, president of the American Dental Association, and Harold Hillenbrand, Association secre-

tary. Also to be in attendance are representatives from the professions and fields of medicine, law, business, government and labor. Total attendance is expected to be about 5,000.

Exhibits of historical interest to dentistry will be on display at the meeting and at various public buildings in Detroit. Awards of merit for outstanding achievement will be presented. A full scientific program and an entertainment program are planned. The convention's general chairman is O. J. Fusilier of Dearborn. C. H. Jamieson of Detroit is chairman of the centennial committee and A. C. Sawicki of Detroit is program chairman.

COLOR TV SCHEDULED FOR CHICAGO MIDWINTER MEETING

A two day program of clinics and demonstrations televised in color will be a feature of the Chicago Dental Society's 91st annual Midwinter Meeting to be held at the Conrad Hilton Hotel February 5-8, according to an announcement by Herman Wenger, general chairman. Action to be televised will originate in a special operating suite set up in the hotel, Dr. Wenger explained, and will be projected on two large screens situated at opposite ends of the Grand Ballroom. Live animals will be used in demonstrations of anesthesia; patients will be used by clinicians in demonstrating technics. Four separate television sessions will consider diagnosis, oral surgery and anesthesia, periodontics and occlusion.

Another feature of the meeting will be a four and a half hour motion picture presentation of the basic anatomy and physiology, operative and laboratory technics and esthetic considerations in complete mouth rehabilitation.

The Society's fifteenth annual research award, going to Isaac Schour and Maury Massler of the University of Illinois Dental School in Chicago and to J. Georges Perrault of the University of Montreal in Montreal, Canada, will be presented at the meeting. The prize-winning paper will be read during the program.

In recognition of their contributions to dentistry and their interest in local dental society affairs, Brig. Gen. Arthur L. Irons (left) and Col. Lynn C. Dirksen (right) were awarded honorary membership in the Southern Maryland Dental Society. N. William Ditzler (center), Society president, made the presentation. General Irons is director of dental activities at Walter Reed Army Medical Center in Washington, D. C., and Colonel Dirksen is director of the Center's Central Dental Laboratory.

EXPECT RECORD ATTENDANCE AT DALLAS MEETING

Heavy advance registration for the 29th annual Mid-Winter Dental Clinic of the Dallas County Dental Society to be held January 22-25 indicates that some 700 dentists, an all-time record, will be in attendance. The registration figures were announced by James R. Nelson, general chairman.

Eight outstanding practitioners, who will serve as clinicians during the three day meeting, are: Jack L. Bailin, South Norwalk, Conn.; Alfred L. Lopez, Albuquerque, N. M.; Paul K. Losch, Boston; John C. Bartels, Portland, Ore.; Aaron A. Moss, Bernardsville, N. J.; Cecil H. Bliss, Sioux City, Iowa; Earl Pound, Los Angeles, and Col. Lowell E. McKelvey, Fort Sam Houston, Texas.

CINCINNATI SOCIETY STARTS POSTPAYMENT PLAN

The first dental society postpayment plan to be supported by all of the major banking interests in a community has been established by the Cincinnati Dental Society, according to the October issue of the society's publication, *The Bulletin*. Support of the banks makes it possible for the dentist to use the facilities of his own bank. Another feature of the plan will make the services of the local credit bureau available to all participating dentists.

The plan stipulates that the minimum loan be $100 but specifies no maximum. Loans under $300 may be made for a period of six to 18 months; larger loans may be repaid over a 24 month period. The patient is charged the bank rate of 6 per cent, plus a $2 service charge. The dentist receives 96 per cent of his fee immediately; 4 per cent is retained by the bank against bad debts. This reserve fund will be reviewed annually by the bank and the dental society, and a reduction in the discount rate is anticipated once the loss experience is established.

Public Health

ARIZONA SCHOOL CHANGES STAND ON FLUORIDATION

The University of Arizona, former advocate of a "go slow" policy, has changed its position. A letter signed by H. V. Smith, associate agricultural chemist, states, "I made it a point of traveling to Newburgh, New York, to get a first-hand picture of the fluoridation experiment being conducted there. An examination of representative members of each class in the grade school revealed no mottled teeth . . .

"As a result of our Newburgh investigation we have decided to withdraw our objection to fluoridation provided careful preliminary studies are made to determine a safe amount of fluorine to use and that frequent checks are made to make certain the fluoridating equipment is working properly."

NEWBURGH REPORT SPURS MOVE FOR DENTAL HEALTH MEASURE

Release December 12 of the ten year report of the Newburgh-Kingston fluoridation study has spurred additional cities to consider fluoridating their water supplies. The study, presented to a meeting of the New York Institute of Clinical Oral Pathology, showed that there had been a 58 per cent reduction in dental caries in the teeth of children who had been drinking fluoridated water all their lives as compared with the rate for children drinking fluoride-deficient water.

On the heels of the announcement of the study's results, the New York City Board of Health disclosed that it had completed a comprehensive and favorable report on fluoridation of the city's drinking water. The nation's largest city has yet to introduce the health measure. It was expected that Mayor Wagner would have the Board of Health report before the end of December. The mayor had requested the study last April after controversy developed within the city administration over the value of the health procedure.

Elsewhere, the effects of the Newburgh-Kingston report also were felt. In New Jersey, Trenton moved toward a fluoridation program after the mayor, fluoridation's highest-ranking opponent there, announced himself converted by the report. Mayor Connolly said the Trenton city council would be convened immediately to enable him to win its approval for a fluoridation project.

Richard M. McLaughlin, sanitation director of the Westchester (N.Y.) County Health Department, said that interest had quickened in seven additional communities; seven towns in the county already use the procedure.

A panel of four investigators presented the results of the Newburgh-Kingston study. In addition to the 58 per cent reduction in caries observed for the children who drank fluoridated water all their lives, the study showed that children aged 10 to 12 in Newburgh (where the water was fluoridated) had a rate 52 per cent lower than that of children in the same age group of the control town of Kingston. The rate of the 13 to 14 year age group was lower by 48 per cent, and the 16 year old group was 41 per cent lower.

Tests by pediatricians showed no differences between the Newburgh and Kingston children in growth, bone structure, blood, urine, vision or hearing. There was no evidence of mottled enamel and none that fluoridation had contributed to gingivitis.

The various aspects of the study were presented by David B. Ast, director of the Bureau of Dental Health of the New York State Department of Health; Edward R. Schlesinger, associate director of medical services of the health department, and Harold C. Hodge, professor of pharmacology at the University of Rochester School of Medicine and Dentistry. The reports were summarized by Herman E. Hilleboe, M.D., New York's health commissioner, who also gave a history of the study.

FLUORIDATION VICTORIES REPORTED BY SEVERAL CITIES

Decisions favorable to fluoridation have been reported from several cities recently. In Milwaukee, a bid to stop fluoridation was killed November 8 by the Common Council utilities committee. The Supreme Court of Ontario, Canada, November 10 upheld the right of the city of Toronto to fluoridate the water of area municipalities which comprise metropolitan Toronto, and in Santa Fe, New Mexico, opponents of fluoridation voluntarily dropped their court suit for an injunction. As a result of the action in Santa Fe, the city will begin fluoridation of the water supply. The health measure will serve some 27,547 persons. In addition, three other communities in the state which were awaiting the outcome of the Santa Fe suit are expected to institute the health measure.

As of December 15, a total of 1,119 communities with a population of 22,099,671 had reported fluoridation projects.

SUBSCRIPTS • A dentist, A. H. Trithart, was elected president-elect of the Tennessee Public Health Association December 2. Dr. Trithart is dental officer of the health department for the West Tennessee region.

Dental Education

ISAAC SCHOUR AWARDED COLUMBIA ALUMNI MEDAL

Isaac Schour, dean of the College of Dentistry, University of Illinois, has been awarded the 1955 research medal award of the Association of Dental Alumni of Columbia University in New York. The award is presented annually for an outstanding contribution in dental research. Dr. Schour will receive the award at a ceremony at the School of Dental and Oral Surgery at Columbia February 16.

HONOR RUSSELL DIXON IN 25TH YEAR AS HOWARD'S DEAN

Two dinners in honor of Russell A. Dixon, who is now in his 25th year as dean of Howard University Dental School, will be held in the coming months. The first will highlight the Robert T. Freeman Dental Society mid-winter clinic scheduled for January 13 and 14 at the school in Washington, D. C. The testimonial banquet will be at the Willard Hotel. Information on the mid-winter clinic and banquet may be obtained from William K. Collins, Society president, 4800 Deane Ave., N.E., Washington, D. C.

The second testimonial will be March 7 at the Hotel Essex House in Newark, N. J. Chairman of the dinner committee is Ulysses Campbell, 27 S. Grove St., East Orange, N. J.

ILLINOIS SCHOOL ANNOUNCES ORAL SURGERY INTERNSHIP

The Research and Educational Hospitals of the University of Illinois have announced a one year internship in oral surgery beginning July 1. Residence at the hospital with room, board, laundry, uniforms and a minimal stipend is offered. Information on the residency may be obtained from the medical director, University of Illinois, Research and Educational Hospitals, 840 S. Wood St., Chicago 12.

RESIDENCIES AVAILABLE FROM TWO SCHOOLS AND HOSPITALS

Residencies and internships have been announced by two schools in cooperation with Veterans Administration hospitals. The University of Alabama School of Dentistry in conjunction with the Birmingham VA Hospital offers a two year residency in periodontology and a two year residency in prosthetics. The Veterans Administration Hospital in Iowa City, Iowa, and the University of Iowa College of Dentistry offer two rotating dental internships and one residency in prosthetics for the year beginning July 1956.

Information on the Alabama programs may be obtained from Joseph P. Lazansky, associate dean, University of Alabama School of Dentistry in Birmingham. Information on the Iowa programs is available from the Chief, Dental Service, VA Hospital, Iowa City.

SCHOOLS SCHEDULE GRADUATE PROGRAMS, REFRESHER COURSES

Alabama • A three day refresher course in diagnosis and treatment of deformities of occlusion, with special emphasis on selective grinding, will be given January 7-9 by the University of Alabama School of Dentistry in Alabama. The course is designed to acquaint the general practitioner with the basic principles of occluso-rehabilitation. Instructor is Louis A. Cohn, of the School of Dental and Oral Surgery, Columbia University.

California • The University of California College of Dentistry in San Francisco announces two refresher courses in dental photography: the first, February 11; the second, March 10 and 11. Samuel M. Nagourney will teach both classes. The February course will consist of illustrated lectures and demonstrations. In the March course students will participate in intraoral and extraoral photography, photography of dental models and in the use of Kodachrome color film.

In addition, the school has announced a three year graduate program in oral surgery for the year beginning July 1956. Training includes clinical and hospital experience and study in the basic sciences. The program is designed to fulfill the requirements of the American Board of Oral Surgery. Further information on the course may be obtained from the school in San Francisco. Application blanks may be requested from the University of California graduate division in Berkeley.

Columbia • April 4-6 are the dates of a course in the diagnosis and treatment of temporomandibular joint pain and dysfunc-

tion scheduled by the School of Dental and Oral Surgery of Columbia University in New York. L. Laszlo Schwartz and associates will teach. The clinical physiology and pathology of the temporomandibular joint will be studied as well as concepts and practices of occlusion.

A postgraduate course in the clinical physiology of occlusion will be given May 23-25. L. Laszlo Schwartz and his associates will teach. Present day concepts of occlusion will be examined in the light of the results of the investigations of the Temporomandibular Joint Clinic of the division of clinical oral physiology.

Illinois • The department of oral and maxillofacial surgery at the University of Illinois in Chicago is now accepting applications for a two year course in the basic sciences. The program begins September 1956. Offered on a full-time postgraduate and graduate basis, the program carries credit toward a Master of Science degree.

Mouth rehabilitation in periodontics and clinical endodontics will be stressed during closed-circuit television courses at the College February 3 and 9. The faculty for the February third course in endodontics will be Louis Grossman, Samuel Turkenkopf and Seymour Oliet of the University of Pennsylvania School of Dentistry. Balint Orban, of Loyola (Chicago) University's dental school, will direct the February 9 program. The faculty will be Bertram Downs and Beryl Ritchey of Colorado Springs, Colo.; Arthur Roberts of Aurora, Ill., and Harry Sicher of Chicago. Robert G. Kesel of the University of Illinois College of Dentistry will moderate round table discussions during both courses.

Kansas City • Applications for graduate study are now being accepted by the University of Kansas City School of Dentistry in Kansas City, Mo. A three year course in oral surgery is offered in conjunction with Kansas City General Hospital Number One and is designed to meet the requirements of the American Board of Oral Surgery. Also offered are 18-month graduate programs in orthodontics, periodontology and pedodontics. The pedodontics course includes a residency program in Mercy Hospital. All graduate courses begin July 1. Candidates for the oral surgery program should have applications on file by March 1.

The school announces also 11 postgraduate courses for the months of March, April and May. Included among them are diagnosis of oral disease, high speed technics, head and neck anatomy and cleft palate rehabilitation.

Pennsylvania • Two courses, one on fundamental concepts of high speed technics, and the other on clinical oral pathology for the general practitioner, are scheduled by the University of Pennsylvania School of Dentistry in Philadelphia. The course on high speed technics, taught by Floyd A. Peyton, will be held April 5 and 6. Clinical oral pathology will be taught by Paul E. Boyle and associates nine Monday evenings March 5 to May 14.

Southern California • A course designed to be of particular value to dentists planning to practice in California is offered by the School of Dentistry, University of Southern California, April 30 to June 15. Entitled "Comprehensive Review of Dentistry," the course covers 16 subjects including laboratory technics and operative procedures with patients. Emphasis is on State Board requirements. Information on the course may be obtained from the director of the division of postgraduate instruction, University of Southern California School of Dentistry, University Park, Los Angeles 7, Calif.

Toronto • Applications for enrollment in postgraduate courses leading to specialist certification will be received by the University of Toronto Faculty of Dentistry in Toronto, Ontario, up to March 1. The programs, which are of two years' duration, lead to certification in dental oral surgery and anesthesia, orthodontics, pedodontics and periodontics. The oral surgery program is for three years.

DEDICATE TEXAS UNIVERSITY DENTAL SCHOOL BUILDING

The new six million dollar teaching and research building of the University of Texas Dental Branch at the Texas Medical Center in Houston was dedicated December 2. The five story, aluminum, glass and marble structure makes possible an increased enrollment in the dental school.

The building contains 50 basic science laboratories designed for use by four-man teams of freshmen and sophomores, 235 individual cubicles for junior and senior students, offices and research facilities, a 397 seat auditorium, two 100 seat lecture rooms as well as seminar and conference rooms and a library.

The new six million dollar teaching and research facilities of the University of Texas Dental Branch at the Texas Medical Center, Dallas, were dedicated December 2.

The basic science laboratories are equipped with two-way communication television systems. Closed circuit television is installed also in the seminar and conference rooms.

As a result of the expanded facilities, the 1955 fall freshman class was increased from 60 to 90 students. The newly established School of Dental Hygiene opened its first session with 21 girls enrolled.

Among guest speakers at the dedication ceremonies were Paul V. Ledbetter, M.D., of the Harris County Medical Society; Logan Wilson, Ph.D., president of the University of Texas; Frederick C. Elliott, executive director of the Texas Medical Center, Inc.; John E. Buhler, dean of Emory University School of Dentistry. John V. Olson is dean of the dental school.

SUBSCRIPTS • Ten state-financed scholarships have been established by the Florida legislature for dental students who are Florida residents. Students, to be eligible, must agree to practice for five years in one of the state's small communities or rural areas in need of dental services. The scholarship committee of the State Board of Dental Examiners and the Florida state dental director will screen candidates.

National Defense

DEFENSE DEPARTMENT NAMES CIVILIAN ADVISORY GROUP

The Department of Defense has extended official invitations to three Association members to serve on the newly established Civilian Dental Advisory Committee to the Defense Department. Announcement of the formation of the committee, which will include dental chiefs of the three Armed Forces also, was made by Frank B. Berry, M.D., before the Association's House of Delegates at the annual session in San Francisco last October. The job of the committee will be to advise the Defense Department on utilization of dental manpower.

It was expected that the committee chairman would be Thomas P. Fox, dentist member of the Civilian Health and Medical Advisory Council to the assistant secretary of defense. Invitations to serve on the committee have been issued also to Daniel F. Lynch, immediate past president of the Association; Francis J. Reichmann, chairman of the Association's Council on Federal Dental Services, and John C. Brauer, dean of the School of Dentistry, University of North Carolina.

BION EAST RETIRES FROM VETERANS ADMINISTRATION

Bion R. East, chief of the dental service at the Veterans Administration Hospital in the Bronx, New York, retired early in October, according to a recent announcement by the Veterans Administration. Dr. East had reached the statutory retirement age of 70.

Prior to his joining the Veterans Administration, Dr. East served dentistry both in the public health field and in the field of dental education. He was director of the dental division of the Detroit Department of Health from 1912 to 1917, joined Columbia University as a research assistant in the School of Public Health in 1938 and rose to the rank of professor of public health dentistry.

B. R. East

In 1945 he became associate dean of the Faculty of Medicine and executive officer of the College of Dental and Oral Surgery, posts he held until his appointment to the VA in 1948. Dr. East was assistant chief medical director for dentistry in the VA from 1948 to 1952.

Brig. Gen. Marvin E. Kenneback (left), (DC) USAF, third vice-president of the American Dental Association and chief of the Air Force Dental Corps, discusses the program of the military dental symposium held October 17 and 18 in San Francisco with Maj. Gen. Oscar P. Snyder, chief of the Army Dental Corps, and Col. Kenneth P. Fulton, Sixth Army dental surgeon. Dental officers from throughout the nation attended.

STEP UP PROMOTION OF DENTAL OFFICERS

Some 289 Army dental officers will be promoted to higher grades during the period ending June 30, 1956. The promotions are the result of a revised promotion policy announced in December by Maj. Gen. Oscar P. Snyder, chief of the Army Dental Corps. Dentists will be eligible for promotion to the grade of major, lieutenant colonel and colonel one year sooner than other Army officers. Consideration is being given to more rapid promotion of lieutenants to the grade of captain, General Snyder said.

The new policy gives additional recognition to the long and expensive training required of dentists before they can qualify for Army commissions and is designed to help attract career officers into the Army. Similar provisions already have been placed in operation by the Navy and Air Force and in all branches apply to physicians also.

A second announcement affecting dentists subject to the draft was issued in December. Paul C. Barton, M.D., executive secretary of the National Advisory Committee to Selective Service, advised the American Dental Association's Council on Federal Dental Services that dentists 40 years of age and older who have accepted reserve commissions and who want postponement of orders calling them to active duty should contact the National Advisory Committee in Washington, D. C., or the dental member of their state advisory committee.

FOUR NAVY DENTISTS ON "OPERATION DEEPFREEZE"

Four dentists are among Navy personnel who sailed during November for Little America as part of a Navy Antarctic expedition. The expedition, named "Operation Deepfreeze," is part of the preparation for a world-wide series of scientific studies to be made by 40 nations during International Geophysical Year, the observance of which will last from June 1957 to December 1958. Nearly 30 stations are to be established in Antarctica to form a major sector of a globe-girdling network of sighting stations.

The four dental officers who sailed with the task force are Lieut. (jg) Cameron H. Keels, Jr., (DC) USNR; Lieut. (jg) John A. MacDonald, (DC) USNR; Lieut. James H. Scribner, (DC) USNR, and Lieut. David J. Knoedler (DC) USN.

The ships of the task force will return when the Antarctic summer is over. The Seabees, however, will spend the winter, and Lieutenant Knoedler will stay with them. He will establish his clinic with portable equipment at the main base and service that and two other bases. He will engage also in a limited amount of dental research.

During a recent trip to the Far East an American Navy dental officer returned to its Japanese owner an officer's sword given to the American as a souvenir by a friend some ten years before. The American, Capt. Merritt J. Crawford, (DC) USN, was aided in his search for the Japanese officer, whose name was inscribed on the blade, by Yoneko Shimizu, a civilian dentist employed at the dental department of the Navy in Sasebo, Japan. In the photograph Captain Crawford (right) returns the sword to the former Japanese officer, Mr. Shizuo Kakigami. Watching the presentation ceremonies are (l. to r.): Lieut. I. D. Cox, (MSC) USN, executive assistant to Rear Admiral H. P. Riebe; Lt. Cmdr. W. N. Rumpanos, head of the dental department, and Admiral Riebe, U.S. Navy inspector general, dental.

APPOINT 17 DENTISTS TO USPHS RESERVE CORPS

Seventeen dentists were among the 86 physicians, nurses, sanitary engineers and pharmacists appointed early in December to the Commissioned Reserve of the U. S. Public Health Service. The new

officers have been appointed under the USPHS's recently announced program to expand the Reserve by organizing and training health and medical personnel for emergency duty in times of national crisis. These officers would be called out to reinforce the staffs of official State and local health agencies as well as to augment the USPHS operating staff. Dentists appointed according to State are:

Maurice J. Friedman of Arkansas, Arvin William Mann of Florida, Orion H. Stuteville of Illinois, Dean E. Frish and Daniel E. Waite of Iowa; Richard C. Leonard and Wesley C. Seward of Maryland, William C. Marx of Massachusetts, Benjamin C. Amundson, William H. Crawford, William A. Jordan and Lawrence S. Wright of Minnesota, Morris J. Boyer of New Jersey, Orien R. Hodgin of North Carolina, Gerald D. Timmons of Pennsylvania, Elvis J. Justis of Tennessee and Donald G. Mantyla of Utah.

OFFICE OF NAVAL RESEARCH AWARDS NINE DENTAL GRANTS

The biological sciences division of the Office of Naval Research, Department of the Navy, announced October 25 that it had awarded nine grants for dental research to universities and nonprofit research institutions. The studies for which awards were made are:

Mechanism of Calcification and the Caries Problem, Albert E. Sobel, The Jewish Hospital of Brooklyn, Brooklyn; Effects of Tryptophan Deficiency on the Teeth and the Periodontium of Rats, Lucien A. Bavetta, University of Southern California, Los Angeles; Proteins and Mucopolysaccharides of Teeth, Walter C. Hess, Georgetown University, Washington, D. C.; Mechanism of Phosphatase Inhibitors in Caries Prevention, Henry M. Leicester and Sidney Epstein, College of Physicians and Surgeons, San Francisco; Effects of Inorganic Components of Foods on Caries Incidence, Robert S. Harris and Abraham E. Nizel, Massachusetts Institute of Technology, Boston; Preservation of Permanent Teeth in Humans, Isaac Schour and Maury Massler; Relationship Between Infection and Pathology in the Apical-Periapical Region, Lucille S. Smith and Paul R. Thomassen, College of Physicians and Surgeons, San Francisco; Oral Microorganisms, Ralph S. Muckenfuss, University of California, San Francisco, and Oral Medicine and Modern Combat Bibliography, Clement R. Brown, Library of Congress, Washington, D. C.

SUBSCRIPTS • Col. Joseph L. Bernier of the Army Dental Corps was given the Ohio State Dental Association's 1955 Callahan Award at the Society's 90th annual meeting November 15.

International

FIVE LANGUAGES CHOSEN FOR TWELFTH CONGRESS

The Twelfth International Dental Congress of the Fédération Dentaire Internationale to be held in Rome September 7-14, 1957, will be conducted in five official languages. A system of simultaneous translation will make the proceedings available in English, French, German, Spanish and Italian. The Congress will be held in the Palazzo dei Congressi. Senator L. Benedetti, president of the Italian Dental Association, is chairman of the Congress organizing committee.

American dentists who wish to register for the Congress may write to Harold Hillenbrand at the American Dental Association's Central Office in Chicago.

U. S. DENTISTS URGED TO JOIN WORLD DENTAL ORGANIZATION

United States dentists were urged to join the Fédération Dentaire Internationale, recognized world dental organization, as a membership drive was launched late in December. Obed H. Moen, U.S. national

treasurer of the F.D.I., pointed out that "supporting membership in the F.D.I. provides the individual dentist with an opportunity to make his contribution to international affairs not only in dentistry but in the broader fields which relate to improved international understanding and good will."

A recent example of the F.D.I.'s value, Dr. Moen stated, was its successful efforts in obtaining the establishment of a permanent dental program as part of the activities of the World Health Organization. John Knutson, chief dental officer of the U.S. Public Health Service, was assigned to help develop that program.

Benefits of F.D.I. membership includes a subscription to the *International Dental Journal*, quarterly news bulletins on F.D.I. activities and reduced fees for official international meetings, including the International Dental Congress sponsored every five years by the F.D.I. The next International Dental Congress will be held in Rome in 1957.

Membership application blanks may be obtained from Dr. Moen, 5 Main St., Watertown, Wis.

SWITZERLAND IS SITE OF 1956 F.D.I. MEETING

The 44th annual meeting of the Fédération Dentaire Internationale will be held in Zurich, Switzerland, May 28 to June 3, 1956. Information on the meeting may be obtained from the secretary of the organizing committee, R. H. Boitel, 41 Talstrasse, Zürich, or from the F.D.I. secretary general, G. H. Leatherman, 35 Devonshire Place, London, W.1.

AUSTRIAN DENTISTS STRIKE OVER SOCIAL SECURITY LAW

As of January 1, contracts determining the fees paid Austrian dentists and physicians by health insurance agencies functioning under Social Security law will be declared null and void. This action is the result of a two day nation-wide strike last August of 15,000 Austrian physicians and dentists who struck over provisions of a proposed health insurance law. The new law, they felt, affected not only the economics of their profession but freedom of practice as well.

More than 90 per cent of the physicians and dentists practice to a major extent through the public health insurance organizations. They have asked that patients who can afford to pay more than the established fees do so, that new clinics be established only after consent of the Austrian Medical Chamber (of which the dentists also are members), that special courts of arbitration with equal representation for the profession be established to settle differences, and that practitioners have the right to discuss freely and openly all problems of public health and health care.

GUATEMALAN DENTAL SOCIETY INSTALLS OFFICERS

The following officers for the 1955-56 term were installed at a recent meeting of the Guatemalan Dental Society: Guillermo Caceres L., president; Manuel Lara G., vice-president; Enrique Porras C., secretary; Gustavo Berger R., assistant secretary; Rodolfo Wer S., treasurer, and Fernando Palomo, librarian.

SALVADOR TERCERO BECOMES MEXICAN SOCIETY PRESIDENT

The Mexican Dental Association, at its October 23-28 meeting in Mexico City, elected Salvador Tercero E., president. Chosen president-elect for the 1958-1959 term was Roberto M. Ruff. Other officers are: Manuel Garrido, vice-president; Alfonso Villafana, first secretary; Francisco Miranda, second secretary; Erik

Martinez Ross, foreign secretary; Francisco Vazquez, assistant foreign secretary; Tiberio Walentin, treasurer; Hector Diaz Ceballos, assistant treasurer, and Luis Farill, Jr., Manuel Rego Espinosa and Miguel Santos, trustees.

ADOPT CONSTITUTION FOR ASIAN DENTAL CONGRESS

Representatives of nine Asian dental associations as well as members of the United States Armed Forces attended the First Asian Dental Congress held October 13-16 in Japan. High on the agenda were the adoption of a constitution for the new organization and election of officers. In addition, delegates took up such problems as the exchange of students and professors between the dental schools of the various countries, dental public health in Asia and problems of dental appliances and materials.

Elected to head the Asian Dental Congress were Yoshio Ogura of Japan, president; Bienvenido B. Eraña of the Philippines, president-elect; Toshio Kashima of Japan, vice-president; Genaro B. Felizardo of the Philippines, secretary, and Sei Sato of Japan, treasurer.

Participating societies were: the Philippine Dental Association, Indonesian Dental Association, Hong Kong Dental Society, Malayan Dental Association, Formosan Dental Association, Dental Association of Thailand, Chinese Dental Association of South Viet-Nam, Japanese Dental Association and the Okinawa Dental Association.

The next congress will be held in Manila in 1958.

SUBSCRIPTS • Prof. K. Falck, dean emeritus of the Institute of Dentistry of the University of Muenchen, Germany, died August 1, 1955. . . . February 23-26 are the dates of the Sixth Reunion Dental de Provincia of the Dental Society of Durango, Mexico. . . . James McCutcheon has been appointed acting dean of the Faculty of Dentistry of McGill University in Montreal.

General

PREPARE PLAQUE IN MEMORY OF WILLIAM H. TAGGART

The year 1955 marks the 100th anniversary of the birth of William H. Taggart, known to the dental profession for his development of the casting process. The American Dental Association memorialized the centennial through the passage of a resolution at the 96th annual session in San Francisco. Now another tribute has been added.

A plaque and scroll describing Dr. Taggart's contributions has been prepared by George M. Hollenback of Sherman Oaks, Calif. To date, Dr. Hollenback has presented plaques and scrolls to 12 dental schools. He plans to present them eventually to all the dental schools. Last March, the School of Dentistry of Temple University, Dr. Taggart's alma mater, received the first plaque.

The tribute to Dr. Taggart says in part, "Dr. Taggart loved his profession. . . . He had a rare combination of skills; he appreciated the value of research; and had an unusual understanding of the

The year 1955 marks the 100th anniversary of the birth of William H. Taggart, known for his development of the casting process. A plaque and scroll in his memory have been presented to a number of dental schools.

scientific approach. His technical ability was of the highest order. He was a patient man, with the willingness to investigate unknown fields. These faculties, combined with imagination and a spirit of adventure, made him one of the great leaders of his time."

SELECT SPEAKERS FOR HINMAN MID-WINTER CLINIC

Eight men have been selected as essayists for the March 18-21 program of the 1956 Thomas P. Hinman Mid-Winter Clinic to be held in Atlanta, Georgia. They are: B. C. Kingsbury of San Francisco, president of the American Dental Association; Douglas A. Yeager of Oklahoma City; Walter C. McBride of Detroit; John P. Frush of San Marino, Calif.; Arne Romnes of Chicago; Walter Colquitt of Shreveport, La.; George Stamper also of Shreveport, and Roland D. Fisher of Glendale, Calif. Information on the meeting may be obtained from the Clinic at 15 Peachtree Place, N.W., Atlanta.

INSTITUTE OFFERS CASE HISTORY SERVICE

Case histories in dental medicine for the 1955-56 year are now being offered by the American Institute of Dental Medicine. The case histories include original 35 mm. Kodachrome slides of the oral condition, pertinent laboratory observations, medical background, roentgenograms, histologic slides, photomicrographs and diagnostic criteria. Case histories are sent out monthly to subscribers. Information on the case history service may be obtained from Mrs. C. Novembri, secretary, 2240 Channing Way, Berkeley 4, Calif.

DENTISTS ASKED TO HELP IDENTIFY MURDER VICTIM

Dentists are asked to help identify a white woman murder victim whose body was found in Riverside County near Anza, Calif., September 18. The woman was 35 to 50 years old, five feet tall, with grey-brown hair. She wore a complete upper and a partial lower denture. It is believed the remaining teeth in her lower arch consisted of cuspids only. The den-

Dentists are asked to help identify a woman murder victim found September 18 near Anza, Calif.

ture is an all-tissue borne prosthesis with no gold clasps.

Both dentures are made of Walthers nylon fiber acrylic resin and are festooned and stippled back to and including the molar teeth. The teeth, described as Myerson teeth, PM2 mold, color F, appear to have little wear. There is a large relief area in the palate. The denture appears never to have been repaired. Information should be phoned collect to the sheriff's office in Riverside.

SET MISSISSIPPI MEETING ON RESTORATIVE MATERIALS

Silicate cements and direct filling resins, fused porcelain, preformed anatomical patterns and denture base coloring, and factors in improved dental plastics are among the subjects to be discussed at the January 26 and 27 conference to be held at the University of Mississippi in University. The conference is sponsored by the Northeast Mississippi Dental Society, the Mississippi State Board of Health and the School of Medicine of the University. Registration is being handled through the University Extension.

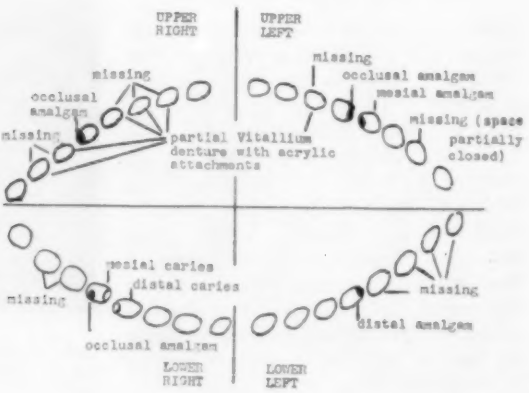
HELP ASKED IN LOCATING TWO WANTED BY THE F.B.I.

Dentists are asked to help the Federal Bureau of Investigation locate two persons wanted for the Chase (N.Y.) bank robbery. Both are in need of dental service. Warrants for the arrest of Thomas Francis Connelly, Jr., and his wife Angelina were issued in August. The Connellys with their two children, a boy aged two and a girl aged three, are known to have been in the Charleston, S. C., area in May, June and July. In July the children were abandoned.

Thomas Connelly is known to be carrying a gun and is considered dangerous. He has used the names Thomas Alfred Connelly, Tom Kelly and Ray Prado. He is 30 years old, 5′ 9″, weighs 175 pounds and is of medium stocky build. He has blond curly hair, blue eyes, fair complexion and has a diagonal scar on the right side of his forehead, a scar under his chin, below his left jaw and one on the back of his left wrist.

Angelina Connelly is 31, has black hair, brown eyes and a medium complexion. She is about 5′ 2″, weighs 100 pounds. Information on the Connellys should be reported to the nearest office of the F.B.I.

Ann Connelly and her mouth chart



The mouth chart for Thomas Connelly was made in July 1950.

KANSAS CITY ALUMNI ANNOUNCE MARCH MEETING

A program of essays, table clinics and scientific exhibits has been planned for the March 4-6 annual clinic meeting of the University of Kansas City School of Dentistry's Alumni Association. The meeting will be held at the Hotel Muehlebach in Kansas City. Essayists include Merle L. Hale of Iowa City, Maury Massler of Chicago, Max Pleasure of New York and Arnold Arms, M.D.

DENTISTS WARNED AGAINST BOGUS SALESMAN

Dentists and physicians have been warned that a man named Herschel L. Rhodus apparently is operating a "confidence game" involving the sale of professional uniforms. Representing himself as a salesman for garment manufacturers, Rhodus allegedly collects cash deposits on uniforms which are never delivered.

According to the September 3, 1955, issue of the *Journal of the American Medical Association*, Rhodus is about 40 years old, six feet tall, weighs 185 pounds and has sandy hair. Warrants for his arrest are held by the police departments of Belleville, Ill., and Summit, N. J. Formerly of Philadelphia, he is believed to be operating in Connecticut. A letter to the editor of the American Dental Association's JOURNAL says that the man has operated in Wisconsin also.

The Uniform Corporation of America, the concern Rhodus has claimed to represent, denies any connection with the man. It has, however, attempted to adjust complaints received because of his activities.

ANNOUNCE MARCH MEETING OF ANESTHESIOLOGY ACADEMY

Two speakers are on the program of the March 8 meeting of the International Academy of Anesthesiology to be held in the Hotel Statler in New York. Jay H. Mervis, anesthesiologist at Gormer Dentists Hospital in Clairton, Pa., will dis-

cuss pitfalls in the use of thiopental sodium, and Arthur Follenius, anesthesiologist at Staten Island General Hospital, has for his subject anesthesia for the hospitalized patient requiring oral surgery.

HISTORIAN AND LIBRARIAN EDWARD HAVERSTICK DIES

Edward E. Haverstick, well known dental librarian and historian, died November 26 at the age of 82. He was author of the *History of Dentistry in Missouri*, published in 1938, and also wrote a history of the Delta Sigma Delta fraternity, published in 1950. He was founder of the library of the St. Louis Dental Society which bears his name. He served also on the former advisory committee to the Bureau of Library and Indexing Service of the American Dental Association.

Dr. Haverstick was president of the St. Louis District Dental Society in 1924 and president of the Missouri State Dental Association in 1950. He was a member of Omicron Kappa Epsilon fraternity, the Fédération Dentaire Internationale and a member of the American Academy of the History of Dentistry.

Also • A registration of 1,069 persons is reported for the recent Pan-Pacific Dental Conference held in Honolulu, Hawaii. . . . Dental societies meeting in the coming months are the Dallas County Dental Society in Dallas, Texas, January 22-25, and the Philadelphia County Dental Society, February 1-3. . . . A grant of $35,000 to the New York University College of Dentistry will support a new bacteriological laboratory at the college. The grant was made by Mrs. Rose Cohen of Brooklyn in memory of her son Morris Cohen, who served on the College faculty for 30 years. Dr. Cohen died July 17, 1954. . . . Edward V. Zegarelli, associate professor of the School of Dental and Oral Surgery, Columbia University, has been named dental member of the 1956 National Health Forum Committee. The 1956 forum, scheduled for March 21 and 22, will discuss chronic illness. . . . The G. V. Black Gold Foil Study Club will meet February 4, 8:30 A.M., at Loyola (Chicago) University School of Dentistry. Practical demonstrations will be conducted on patients in the school clinics. . . . Other meetings announced for February and March are the American Association of Endodontists in Chicago, February 4 and 5; Tufts University Dental Alumni Association at the University in Boston, March 7 and 8, and the Cincinnati Dental Society, March 19. . . . St. Paul will play host to the 73rd annual meeting of the Minnesota State Dental Association April 23-25. . . . "Very different from an average association meeting" is the way the December Greater New York Dental Meeting was described in an advertisement by Wallachs, New York men's clothing shop. "Instead of a back-slapping convention it was a postgraduate school, with everyone attending clinics, going to lectures, watching closed-circuit telecasts."

Book Reviews

SHEARER'S MANUAL OF HUMAN DISSECTION

Edited by Charles E. Tobin, Ph.D. Third edition. 287 pages with 79 illustrations. Index. $6. New York, The Blakiston Division, McGraw Hill Book Co., Inc., 1955.

This book is in fact not as much a manual of dissection as it is a manual of regional anatomy. The most important feature of a dissecting guide should be "how to expose" the structures rather than what structures to expose and to study. However, it certainly fulfills the aims of the author and editor "to point out to the inexperienced dissector what structures he can reasonably be expected to see in the time at his disposal." The danger of presenting the descriptive and regional anatomy in so short and concentrated form is obviously the reluctance of many a student to follow the author's advice that "the knowledge gained in the dissecting room from the body with the aid of the dissecting manual should be supplemented by constant reference to one of the standard descriptive texts."

Many of the semidiagrammatic sketches illustrating the text seem to this reviewer to be too crowded to serve the beginner as a clear guide.

H. Sicher

UNDERSTANDING THE OLDER CLIENT

By M. K. Hollender, M.D.; L. Greenleigh, M.D., et al. 64 pages. 90 cents. Reprinted from Social Casework Journal. New York, Family Service Association of America, 1955.

These nine articles were written by psychiatrists or social workers from their work experiences with elderly persons in various settings. The articles are well written, and case reports illustrate the subject matter. Two of the articles are related primarily to the specialized field of institutional care; the majority contain more general material that should be helpful to the reader in understanding the elderly person as citizen, client and parent.

The individual's self concept rather than physiological change is considered to be the major factor affecting adjustment in later years. The loss of self esteem resulting from various stresses which the elderly person has to meet is discussed. Stress results from such events as retirement, the isolation that comes from loss of family and friends through death or rejection, economic problems and physical and mental limitations. The emotional reactions of the elderly person to these stresses of later years are well defined as are the cultural attitudes, which often do not reflect the facts and which tend to distort the way society and the individual view his assets and potentials for satisfying and useful experiences.

The authors suggest a need for a reevaluation of our cultural attitudes toward older people, and these papers certainly offer a substantial contribution toward that goal.

Ruth E. Allen

A MONOGRAPH ON ANNEALING GOLD FOIL

Author anonymous. 19 pages with illustrations. Appendix. Price not listed. Philadelphia, Morgan, Hastings & Co., 1955.

The subject is well and conclusively covered. The author tells why gold foil should be annealed, what contaminates it and how to protect it. He describes methods of annealing, both the piece by piece method and the method of bulk annealing. About half the dentists who answered a questionnaire on the subject anneal the foil piece by piece; the other half use the bulk method, with equally good results.

The importance lies not in the method of annealing but in the accuracy of the procedure: namely, the driving off of gases which may have contaminated the pure gold and which if they remain would render the gold noncohesive.

The information presented is not new, but it is well to stress its importance, as gold foil not annealed thoroughly means failure of the restoration.

The material used by the author is scientific and correct, but his style of expression is poor. There is unnecessary repetition of words and irregular arrangement of phrases.

The illustrations are clear; however, one of them is somewhat of an advertisement instead of being merely an explanation of the subject matter. The type size and style are good.

Harry A. True

BETTER HEALTH FOR YOUR CHILDREN

By I. Newton Kugelmass, M.D. 341 pages. Index. $4.50. New York, McGraw-Hill Book Co., Inc., 1955.

Much good material is contained in this volume, which has the subtitle *A Medical Guide for Parents,* but there are some points on which the approach appears somewhat too casual. For example, in the section on first aid, application of iodine tincture to wounds is advised without any reference to precautions against the potential dangers of this antiseptic. Questionable also is the recommendation on use of sulfa ointments; these ointments are virtually never used any more in the manner proposed by Dr. Kugelmass.

The book is divided into six main sections. In the first, headed "Care of the Sick Child," first aid and nursing care are considered. The second section discusses disorders of the body as a whole, including diseases of the glands, allergy, acute and chronic infectious diseases. Another section, dealing with disorders of the brain, pays extensive attention to help for mentally retarded children. Still other sections cover disorders of sense organs, of internal organs, and of the body framework, under which skin conditions are included.

The author writes freely about a wide variety of drugs and their uses. It is to be hoped that the family practice of medicine would not go beyond reasonable bounds in this connection.

Written in brief, staccato style, the discussion should be easy for the average parent to follow. Undoubtedly, helpful orientation on many medical problems will be obtained through family use of this volume.

William W. Bolton

PROGRESSIVE PRACTICE IN DENTISTRY

By Edward Samson. Third edition. 328 pages with 15 illustrations. Index. 25 d. net. London, The Technical Press, Ltd., 1955.

Mr. Samson has packed between the covers of this book a wealth of information. There are 16 chapters and better than 225 individual subheads. Obviously, not much space could be devoted to all of them. However, he manages to extract the meat of the nut.

He begins his book with a section called "General Considerations" and starts out by showing no pity for English dentists who bemoan the fact they are not called "Doctor." He sums up his feelings by saying "status . . . cannot be bought or given; it must be earned . . . It is not glory gratuitously bestowed upon us by our fellows—it is that amount of their esteem which we may earn by our efforts to improve ourselves. So much for status."

With an eye for the most minute detail, the author proceeds to outline the practical steps for becoming an admirable "tooth puller." (Many of his phrases and expressions have a "tongue-in-cheek" connotation.) The first step is to select a location ("popular professional streets do not provide ready-made incomes"), then hire an efficient staff ("an over-tall or stout woman may appear overbearing, often formidable") and decorate the office suite ("no goldfish will serve to allay the pain of a sensitive tooth").

This book is so written that it may be ideally used for a reference. The author has covered his chosen subject as thoroughly as possible without employing the strict pedantic approach so often seen in texts. He is obviously a man with a sense of humor. The book is certainly no great literary tome. But with equal certainty, it is one the reader will enjoy.

The book is well assembled. The typography, binding and paper are good. It is a readable volume from the technical point of view as well as from the literary aspect.

Theodore C. Levitas

FUNDAMENTAL CONSIDERATIONS IN ANESTHESIA

By Charles L. Burstein, M.D. Second edition. 219 pages with 84 illustrations. Index. Price $5.50. New York, Macmillan Co., 1955.

This book is designed primarily for the student in anesthesia. It is written simply with good illustrations and manages to cover the subject matter in a comprehensive manner.

The author attempts to explain many of the various phenomena associated with the autonomic nervous system that occur during anesthesia. The experimental proofs he presents to support many of his contentions are convincing. He has revised the first edition to some extent and has added valuable information on new and recent developments in anesthesia. He has achieved also the difficult task of translating basic pharmacological and physiological facts to interpret many puzzling problems in clinical anesthesia, especially those dealing with the respiratory and the cardiovascular systems.

Added sections on muscle relaxants and induced hypotension are very informative. This book will do well for the clinician and the teacher of anesthesiology.

Max S. Sadove

ZAHN-, MUND UND KIEFERHEILKUNDE IN VORTRÄGEN: HEFT XVI, ZAHNÄRZTLICHE ROENTGENOLOGIE IN DIAGNOSTISCHER UND THERAPEUTISCHER ANWENDUNG (LECTURES ON THERAPY OF THE TEETH, MOUTH AND JAWS: VOL. XVI, DENTAL ROENTGENOLOGY IN DIAGNOSTIC AND THERAPEUTIC APPLICATION)

Edited by G. Korkhaus. 204 pages with 228 illustrations. Index. 32 DM. München, Carl Hanser, 1955.

An interval of more than six years has elapsed since the first volume of this excellent series appeared. Many valuable books followed, and now the sixteenth volume, dealing with roentgenology in dentistry and containing interesting contributions by 11 prominent German authors, is published. This book is a valuable source of information for dental practitioners and students, and it is highly recommended to all interested in roentgenology. The editor and his coauthors can be congratulated on the care in preparation and selection that is evident throughout all pages. So much information is crowded into this comparatively small volume that it will prove to be a helpful reference for further study; it should be a delightful reading as well as a cultural experience.

Paul H. Glucksman

ORTHODONTIE IN DER TÄGLICHEN PRAXIS (ORTHODONTICS IN DAILY PRACTICE)

By R. Hotz, Prof., M.D. 314 pages with 305 illustrations. Index. 46 Berne Fr. Berne, Switzerland, Hans Huber, 1954.

Considering the wide scope of its subject, this book is amazingly complete and well written. A full review of orthodontics is given, including the diagnosis of abnormal conditions, their origin and cause; the general and special technics of treatment, together with the causes of failure, and finally a complete index and bibliography.

This book shows how certain difficulties, caused by war and other external circumstances, had to be overcome in Germany before "orthopedics of the jaw" (orthodontics) could again receive more attention and time.

The data are excellently reproduced in a large number of drawings and photographs. All references (among them many American sources) are readily accessible in a comprehensive bibliography, which includes reports by various European governmental agencies.

The volume is comparatively small and easy to handle; it is attractively bound, printed in clear type on good paper, and it is well arranged. It is recommended to any practicing dentist, especially to one who can read German, and who wants a brief but satisfactory summary of the contemporary European studies on orthodontics. The main drawback is that the text and the explanations are written in scientific German, and it will require more than a superficial knowledge of this language to make efficient use of this work.

Paul H. Glucksman

MIKROSKOPISCHE UNTERSUCHUNG DER BEDECKTEN MUNDSCHLEIMHAUT (MICROSCOPIC EXAMINATION OF THE ORAL MUCOUS MEMBRANE)

By Dr. Robert J. Th. Eisenring. 104 pages with 74 illustrations. Index. Munich, Carl Hanser, 1955.

The author is interested in that part of the oral mucosa which in denture construction is exposed to the denture base. He is particularly interested in the palate which carries a full denture. The investigation was made by clinical observations, histopathologic examinations of biopsy material and examination of cytologic material obtained by smears from the surface of the mucous membrane.

The results of this investigation show that the tissue changes found in the denture-bearing regions of the oral mucosa are nonspecific and are due mainly to the contact relation between the denture base material and mucous membrane and the different nonphysiologic functional influences of the denture base on the tissues.

The individual tissue response to the irritation is of importance. The tissue changes, such as atrophy of the mucous membrane, loss of functioning elements of the mucous glands and excessive keratinization of the epithelial surface, are permanent in their nature and are not repaired after elimination of the denture.

The author could not find a definite relation between precancerous transformation of the epithelium and denture irritation. These changes in the mucous membrane can be produced by any type of denture base, metallic or nonmetallic.

The illustrations are excellent. The chapter on pathologic changes is preceded by a detailed description of the normal palatal mucosa. There is a good bibliography at the end of the booklet, but much of the American literature is missing.

Balint Orban

DEUTSCH-ENGLISCHES, ENGLISCH-DEUTSCHES WÖRTERBUCH FÜR ÄRZTE (GERMAN-ENGLISH, ENGLISH-GERMAN DICTIONARY FOR PHYSICIANS)

Vol. I. by F. Lejeune; Vol. II. by F. Lejeune and W. E. Bunjes. 1,350 and 1,740 pages. $7.85 and $13.75. Stuttgart, Georg Thieme, 1954 and 1953.

These dictionaries contain nearly all terms used in the medical and dental literature of the English and German speaking countries. They appear to be the best and most complete works of bilingual dictionaries and will be a valuable aid to dentists and researchers interested in German literature. They are well bound, printed on thin paper and, even if the type appears to be too small, which may cause eyestrain and fatigue, other features of the printer's art give the work a pleasing appearance. These new dictionaries are excellent books to have and to use.

Paul H. Glucksman

DIE WIEDEREINPFLANZUNG VON ZÄHNEN IN DER TAGLICHEN PRAXIS (THE REPLANTATION OF TEETH IN DAILY PRACTICE)

By Fritz Schön. 70 pages with 106 illustrations. Index. 6.90 DM. Leipzig, Johan Ambrosius Barth, 1954.

The topic of this monograph is the replantation of teeth. After a historical review, the author discusses the scientific principles of wound healing which occurs in replantation, transplantation and free autogenous grafts. One chapter deals with the experimental investigations of replantation. The primary point of interest is the part which deals with the opinions of researchers concerning the preservation or removal of the periodontal membrane before replantation.

Dr. Schön believes the membrane should be saved and that only those portions of it which are injured should be removed. He advocates the replantation of multirooted teeth on which unsatisfactory root canal work has been performed. Replantation is advocated also for gangrenous teeth and after arsenic periostitis.

He utilizes his procedure even in teeth where there is a chronic rarefying osteitis with small granulation tissue present. He does not eliminate the focus before replantation, because its disappearance is proved postoperatively in many instances.

Despite the accompanying photographs supporting the author's contention, this reviewer cannot recommend the procedure discussed. Dr. Schön's approach to the problem of replantation is a radical concept of treatment for preservation of molars. There is much danger involved in such operations. The operator must be well versed in pathology and surgery. In general, replanted teeth undergo resorptive changes.

The preparation of the patient, the surgical procedures and the principles of the postoperative treatment are clearly and extensively described. The case reports are descriptive and concise. The book is a fine addition to the dental literature.

Eugene Schorr

RÖNTGENDIAGNOSTIK DES SCHÄDELS (ROENTGENOGRAPHIC DIAGNOSIS OF THE SKULL)

By Willy Loepp and Reinhold Lorenz. 579 pages with 613 illustrations. Index. 97 DM. Stuttgart, Georg Thieme, 1954.

The introductory chapters on normal skulls and those on skulls deformed by disturbances of development and growth are followed by material on inherited disorders (dysostoses), endocrine disturbances, generalized diseases (Paget, Albright), lipoid storage diseases (Niemann-Pick, Hand-Chester-Schüller-Christian, and others), avitaminoses and parasitic diseases and inflammatory diseases, which may affect the roentgenographic appearance of the skull. Special chapters are devoted to benign and malignant tumors. The more extensive chapters are those on skull fractures (including fractures of jaws and teeth), the basis cranii, sella turcica, temporal bone, sinuses, orbit and jaws and teeth. A final section is devoted to roentgenographic technic.

Material in the chapter on jaws and teeth includes a brief account of development and general roentgenology, inflammatory diseases of the teeth, apicoectomy, granulomatous swellings, epithelial cysts, inflammatory diseases of the jaws, nonpyogenic necrosis of the alveolar processes, benign and malignant tumors, local amyloid tumors, acromegaly, rickets, familial fibrous dysplasia of the jaws and systemic disease (Albers-Schönberg, von Recklinghausen, and others).

This book illustrates and describes a wide range of injuries and diseases of the skull and should be highly valuable to the diagnostic

roentgenologist. Well over half the material presented should be of direct interest to those engaged in maxillofacial and oral surgery.

The roentgenograms are excellent and well selected. They are reproduced by a fine-screen process on good quality smooth paper to give clarity and minute detail.

The book is well indexed according to author and subject. A valuable feature is the bibliography which gives a generous sampling of the pertinent recent literature and a few of the classical works. Some 700 references are given, of which nearly 90 per cent are to German articles; the remainder are chiefly in English with only a few titles in French and Italian.

The crisp, concise style of the author and the similarity of many of the German medical and anatomical terms to their English equivalents should permit easy comprehension by those with only a fair reading knowledge of German.

Vernon E. Krohl

THE PHARMACOPEIA OF THE UNITED STATES OF AMERICA

Prepared by the Committee of Revision and issued by authority of the 1950 U. S. Pharmacopeial Convention. Fifteenth revision. 1,178 pages. Index. $10. Easton, Pa., Mack Publishing Co., 1955.

This work, which is generally called the *USP*, is revised at five year intervals. In the period between revisions, supplements are sent to those purchasers of the book who request them. The *USP* has official standing under the terms of the federal Food, Drug and Cosmetic Act. Drugs listed in it are referred to as "official." The standards of the fifteenth revision of the *USP* will probably become effective late in 1955.

The *USP* lists drugs and pharmaceutical aids "the utility of which is most fully established and best understood." Mere extensive use is not a sufficient basis for the listing of a drug in the *USP*.

The major portion of the book consists of monographs which describe drugs, specify tests for them and mention at least one category for their use. If a drug is for internal use a usual dose is stated; and, in this revision for the first time, a range of dosage is given. The statement with regard to category of use is also a new feature.

About one third of the book is devoted to test procedures, processes, apparatus, reagents, atomic and molecular weights, conversion tables for temperature, weights and measures, and a general index.

Editorially, this revision is much improved. In accordance with current trends, dosages are given in the metric system exclusively. Ml. has replaced cc., very little Latin is used and the chemical structural formulas are streamlined and easier to read.

This revision of the *USP* should be in every dental school library and in the office libraries of those who teach or do research in pharmacology and therapeutics.

Donald A. Wallace

PRIMARY ANATOMY

By H. A. Cates, M.B., and J. V. Basmajian, M.D. Third edition. 339 pages with 441 illustrations. Index. $5.75. Baltimore, The Williams & Wilkins Co., 1955.

By devoting 187 pages of this book to bones and muscles, the authors have carried out adequately their intention of writing a book especially for students in physiotherapy, occupational therapy, physical and health education and nursing. Surface anatomy, articulations, function and action are stressed, and this emphasis is particularly important. The rest of the book treats the other systems of the body in a manner which is useful to individuals in these fields.

The illustrations are well labeled and are adequate. They are simple and are easily studied, a virtue which is lost in many books. The organization of material, type size and style make the book a pleasure to read.

Relations between parts of the body are not stressed enough, and the systems should be more fully described for dental or medical students. However, many useful ideas will be found for students in these fields. The authors have written a good book in the fields for which it is intended.

Earl O. Butcher

PRACTICAL ORAL SURGERY

By Henry B. Clark, Jr., M.D., D.D.S. 392 pages with 223 illustrations. Index. $8.50. Philadelphia, Lea & Febiger, 1955.

This book is divided into 16 chapters on important subjects in oral surgery. It is clearly printed and well written. Photographs and line drawings are most meaningful and play an important part in making clear the descriptions of technics and procedures which are presented in the text.

In the preface the author states, "In a sense this has taken the form of a handbook of what the dentist in general practice should

know about oral surgery." Dr. Clark calls attention to the fact that a wide variety of procedures has been reported in the literature for the treatment of many oral surgery problems and states, "One or two good ways of doing a task are offered, in the hope that the student will learn them well and do them often."

The book is well arranged, and the material logically presented. For example, history taking, medical conditions of importance in oral surgery, instruments and their use, application of aseptic principles, surgical technic, soft tissue surgery, hard tissue surgery, care of the injured patient, acute infections and hospital practice are presented in this sequence. Benign and malignant tumors are described and discussed. The final chapter, "The Art of Practice," is a well written dissertation on a most important subject.

This is a comparatively small book, written clearly and to the point, and it should be an effective guide to oral surgery practice.

Warren R. Schram

MODERN DRUG ENCYCLOPEDIA AND THERAPEUTIC INDEX

Edited by Marion E. Howard, M.D. Sixth edition. 1,477 pages. Index. $15.00. New York, Drug Publications, Inc., 1955.

The Modern Drug Encyclopedia and Therapeutic Index is revised every few years. A bimonthly supplement providing descriptions of the newest drugs and a cumulative index is sent to purchasers of the book.

The products listed are mostly patented and trademarked brands available through drug stores. Some are prescription items; some are available over the counter. Product descriptions, actions and uses, routes of administration, dosages and commercially available dosage forms are given.

In addition to the descriptive matter, there is a therapeutic index, a generic name index, a manufacturers' and distributors' index and a general index. In the present edition, generic names are not emphasized, and the index to generic names is likely to be overlooked by the reader. The generic name index and general index might well be combined in future editions.

Although listing is by trade mark name in most instances, many trade marked brands are not included. The substantial identity of some drugs is not always made obvious to the reader. In at least one instance two which are the same drug are described separately. Several brands of the antibiotic tetracycline are listed in different parts of the book without direct cross-reference.

The criteria used in selecting products for listing are not revealed in the book. Apparently drug houses who distribute products on a nationwide basis supply the bulk of the descriptive material. Such information is usually reliable, although not always critical.

The Modern Drug Encyclopedia represents an effort to meet a real need by means of a compact volume plus convenient supplements. It is a useful reference book.

Donald A. Wallace

TALKING WITH PATIENTS

By Brian Bird, M.D. First edition. 154 pages. Index. $3. Philadelphia, J. B. Lippincott Co., 1955.

This small book written for medical practitioners and students is an attempt to stress the importance of conversation between patient and physician. The material was originally published in *American Practitioner and Digest for Treatment*, May, 1955. The text contains 30 chapters and is divided into two parts: part one, adults, chapters 1-17; part two, children, chapters 18-30.

In the introduction, the author states, "Of all the technical aids which increase the doctor's power of observation, none comes even close in value to the skillful use of spoken words—the words of the doctor and the words of the patient.

"Throughout all medicine, use of words is still the main diagnostic technic, and while in therapy many mechanical and chemical aids are truly miraculous in their effectiveness, words continue to play a tremendous role."

Although a resolute attempt is made to justify the above thought, in this reviewer's opinion, the author has succeeded only partially in his efforts. The book makes no significant contribution. Much that is discussed is fairly accessible elsewhere. The material seems rather rambling and diffuse. Categorical or sweeping statements are frequent. The style of writing is not lucid, and the text in the main is not well organized. The terminology and the author's methods of approach seem very elementary. In some instances he confutes his own statements.

This work may be of some value to an inexperienced physician or student who wishes to glean some knowledge of this subject. On the other hand, because the book contains a number of conflicting ideas, the reader is likely to end up inspired by the subject's potentialities and confused by the book's shortcomings.

E. Alan Lieban

YOUR ANNUAL MEETING: HOW TO MAKE THE MOST OF IT

By Bernard Carp, Ph.D. 168 pages. Appendix. $3.50; $2.50 to members of the National Publicity Council. New York, National Publicity Council for Health and Welfare Services, 1955.

Your Annual Meeting supposedly has been written as an aid to persons charged with the responsibility of planning and conducting an organization's annual meeting. The purpose of the book is commendable; the result is not.

Unfortunately, the author's scope is limited. His ideas regarding annual meetings are too basic for those with any experience in such undertakings. The book lists reasons for an annual meeting, it discusses organization of committees and planning of the program. It mentions the various types of programs that can be planned such as individual speakers, panel discussions, a symposium, workshop, seminar or clinic, all of which are well known. Also treated briefly are the subjects of publicizing, promoting and evaluating the meeting. A good example of a chairman's annotated agenda and time table suitable for a brief affair such as a dinner meeting is listed in the appendix.

The author considers the subject of annual meetings in terms that are too general. He is thinking in terms of meetings, the main purpose of which is to consider financial reports, reports on the organization's activities the past year and reports on what the organization is planning for the coming year. In essence, the book discusses business meetings of organizations rather than complex scientific meetings of interest to most dental societies. It appears to be designed for small, local organizations such as social welfare groups and community chest agencies.

Although the book may be of value to some types of organizations, it offers very little to members of annual meeting committees of dental societies, other than perhaps the rank novice.

H. Leon Snow

YOUR HEALTH TODAY

By W. W. Bauer, M.D. First edition. 514 pages with 111 illustrations. Index. Appendix. $5. New York, Harper & Brothers, 1955.

The purpose of this book is to present health in an interesting manner to the lay mind. This, as the author relates in the preface, is a very difficult task.

In the past the subject of health has been presented to the public in all forms including, in recent years, radio and television. Unfortunately, most of the presentations have been made by physicians and dentists who, by virtue of their lack of training, are poorly equipped for the job. It is generally acknowledged by those who know that the Hooper rating of their efforts is extremely low.

The author of this comprehensive text has covered the health field thoroughly all the way from diet to accidents. He has presented the subject in as interesting a manner as is possible for a physician who is no Hemingway or Ruark. However, even if one of these popular writers could and would write a book of 500 pages on health with a price tag of five dollars it is doubtful that the book would have wide circulation.

This book can and probably will be used extensively as a text in high school and college courses in hygiene, but we must remember these courses are compulsory. In justice to the author it must be said that he has handled an unpopular subject in an adequate manner, professionally speaking. The illustrations are good but dull. Who is interested in a physician looking into a patient's ear or in a hospital operating room scene. This criticism is not directed at the author so much as at the subject matter. How can an illustration of health be made interesting? As the author states in his preface he wrote this book "with tongue in cheek." He well knows that the majority of people are not interested in their health until they lose it.

F. C. Cady

A MANUAL OF ORAL EMBRYOLOGY AND MICROSCOPIC ANATOMY

By Dorothy Permar. 109 pages with 49 illustrations. Index. Price $3.75. Philadelphia, Lea and Febiger, 1955.

This manual is designed to meet the needs of the student in dental hygiene. It is clearly written, the type used is readable, and the book is printed on a good grade of paper and is well bound.

The author introduces the subject with a discussion of the development of the human body. This discussion is far too brief; it should either have been deleted or augmented for a clearer understanding. It would have been improved by the addition of several photographs, properly labeled, of human embryos in various stages of development. This section is followed by a brief but clear description of the development of the face. The illustrations do not

portray adequately the developmental process. The schematic diagrams of frontal sections through the head could have been augmented by actual photographs. A photograph of an adult face with the developmental regions marked or colored on the photograph would have enhanced the value of this section.

The chapters on oral histology are presented in orderly sequence, and the text material is adequate for the purpose intended. The author, in the preface, defends the use of simplified drawings as leading to a better understanding. However, a few photomicrographs could have been used to advantage.

Chapter 11 details development of the teeth. A clear understanding of adult tooth structure is regarded as helpful in visualizing their embryonic development. Since the development of the face is directly related to development of the teeth, these sections might logically have been placed together.

In general, this manual offers a good foundation in oral histology and embryology for the student in dental hygiene.

Alton D. Brashear

DIE MUNDFLORA IM LICHTE NEUER ERKENNTNISSE (THE ORAL FLORA IN THE LIGHT OF RECENT CRITERIA)

By Prof. Guido Fischer and Erwin Santo, M.D. 86 pages with 21 illustrations. Stuttgart, "Lege Artis," 1955.

This paper bound booklet is the first of a series on biological research in dentistry. It is an exceptionally valuable contribution to the recent literature on microorganisms, especially to that on the oral flora. This treatise has a dual purpose.

First, it presents a much needed evaluation of the bacterial flora of the human oral cavity and its biologic effects on the dental system (written by Dr. Fischer). Second, it furnishes a pattern for a similar evaluation of the bacteria of the human oral cavity and the importance of the new theory on infections (written by Dr. Santo). Both chapters contain important and interesting points that might be helpful to the practicing dentist interested in microbiology. The book is written in simple and direct language; the illustrations and slides (some in color) are excellent. An index would make the subject matter more accessible.

Paul H. Glucksman

HEALTH SUPERVISION OF YOUNG CHILDREN: A GUIDE FOR PRACTICING PHYSICIANS AND CHILD HEALTH CONFERENCE PERSONNEL

Prepared by the Committee on Child Health of the American Public Health Association. 179 pages. Appendix. $2. New York, The American Public Health Association, 1955.

This reviewer had the privilege of participating in the early deliberations and discussions of the committee preparing *Health Supervision of Young Children*. It was evident that a historic guide would result from the thoroughness exhibited in collecting manuals from state and local health departments and other agencies operating child health conferences. Tabulations were made of materials, and the literature was reviewed searchingly. By wide distribution of the first and subsequent drafts, by review conferences and then by final conferences, many authorities aided in completing a manual of distinction. *The American Journal of Public Health* correctly termed it a milestone.

Chapters include subjects such as parent counseling, everyday problems in normal development, health appraisal and care, child health conference procedures and health education.

The chapter on everyday problems in normal development emphasizes some of the problems that are most often misunderstood and mismanaged. These problems include typical worries of mothers, anticipatory guidance and growth and personality.

Can this guide be recommended for dentists? The answer is an emphatic yes. The application of suggestions offered in its pages will help make examinations and treatment less disagreeable for preschool age children.

The dental items given under the heading "Teeth" reflect for the most part the opinion of dental authorities, although the wording "parent counseling might include discussion on the values of fluoridation of the community water supply" would perhaps reflect uncertainty as to the value of the health measure.

Advising the physician to "refer cases showing decay for dental examinations" might well have been changed to "refer all children for dental examinations." Surely the average physician has not the training to discover incipient dental disease.

J. M. Wisan

Current Literature

MORPHOLOGY OF THE PULP CAVITY OF THE PERMANENT TEETH

David Green. Oral Surg., Oral Med. & Oral Path. 8:743 July 1955.

One hundred and sixty permanent teeth were selected for this anatomic study (ten teeth of each variety—central incisor, lateral incisor, and so forth). The teeth were cut in vertical sections to the canals by means of a revolving, wet stone. Care was used to avoid grinding past extremely fine, curved, and tortuous canals. The canals were tinted with a red dye for viewing and photographing.

The average length of the tooth, the ratio of root length to crown length and a description of the pulp chamber and canal or canals were recorded for each type of tooth. This information assists the operator in determining the depth of insertion of guide wire into the canal before taking a roentgenogram for measurement control and assists the operator in estimating the root length when he is unable to obtain a satisfactory roentgenogram for some reason. The usual location of canal orifices was obtained, and the suggested endodontic approach to pulp chambers, varying with floor shapes and positions, was determined.

Tooth length may vary in proportion to the height of the individual and frequently has a relationship to age and head shape. The teeth of women usually are shorter than those of men. The average ratio of root length to crown length is about 1.5 to 1.

The entire maxilla and the mandible are made up of harmonious curves, and the roots from cuspid to molars curve distally at approximately an 85 degree angle to the occlusal surfaces. There is an additional inclination of teeth, the axial inclination from a mesial aspect of the tooth. The axis of the incisors is about 60 degrees and that of the cuspids approximately 80 degrees. The maxillary bicuspids are almost in a vertical position with only a slight buccal inclination which increases from the first to the third molars. The mandibular bicuspids have a lingual inclination of about 85 degrees, and the mandibular first and second molars tilt lingually at about 80 and 75 degrees respectively.

The pulp cavities conform generally to the outline of the teeth, but the deposition of secondary dentin may alter the outline. The pulp chamber of the posterior teeth may vary in height from 0.5 mm. to 5 mm. with a 3 mm. average for adults.

When operating on posterior teeth for endodontic treatment, it is suggested that the operator stand in front of the patient and hold the mouth mirror so that the flat surface is parallel to the distal surface of the tooth. This practice will help obviate any illusion regarding the true position of the canal orifice. When approaching the pulp cavity, the operator should study the deviation of the central axis of the tooth and pulp cavity by studying the line of vision in addition to the tooth inclination. The operator also should take into consideration the possibility of variation in the angle of inclination due to malposition of the tooth. A thorough study of the position of the tooth in the bone is essential before beginning work in the pulp cavity.

Ralph L. Ireland

DIPHENYLHYDANTOIN SODIUM HYPERPLASIA: HYDROCORTISONE ACETATE AS AN ADJUNCT IN ITS TREATMENT

Melvin Spira. J. Oral Surg. 13:280 Oct. 1955.

A study was made of mentally defective, institutionalized persons with epilepsy who had been treated with diphenylhydantoin sodium (Dilantin Sodium) and who exhibited varying degrees of gingival hyperplasia.

Both conservative and radical measures have been advocated in the treatment of this condition. The conservative approach, useful as a prophylactic measure and where minimal hyperplasia exists, includes the removal of all irritative factors (calculus, poor restorations, and so forth), the correction of the occlusion to minimize stress and the institution of a rigid oral hygiene regime. Where gross hyperplasia is present, however, surgical removal of the overgrowth is necessary as an initial procedure.

Recently, hydrocortisone acetate dental ointment has been reported beneficial as an additional method of treating this condition. The effectiveness of hydrocortisone as an anti-inflammatory agent inhibiting fibroblastic proliferation is well established.

Of the group studied, six patients were chosen in order to further evaluate the usefulness of this form of therapy. Four patients were treated with the hormone, and two were

used as controls. Each patient received a thorough prophylaxis prior to treatment and, during the study, every effort was made to maintain similar degrees of oral hygiene. In each instance, gingivectomies were performed to remove the hyperplastic gingival tissue. Hydrocortisone dental ointment 2.5 per cent was massaged into the gingiva of patients in the experimental group three times daily after each meal. Two of the treated patients showed considerable improvement, one evidenced only slight improvement and the fourth patient, none. The latter two patients did not cooperate as well as the former. The two patients who served as controls developed regrowth soon after gingivectomy. Hydrocortisone acetate dental ointment appears to be an effective adjunct in the treatment of patients afflicted with diphenylhydantoin sodium hyperplasia.

LINGUAL RIDGE EXTENSION

Jack B. Caldwell. J. Oral Surg. 13:287 Oct. 1955.

In this article an operation for deepening the lingual sulcus is described. The purpose of the operation is to create a sulcus which permits extension of the lingual periphery of the lower denture in instances where alveolar resorption and atrophy of the mandible make construction of satisfactory complete dentures virtually impossible otherwise.

The technic, which is fully described and illustrated, involves elevation of a lingual mucoperiosteal flap, detachment of the mylohyoid muscle, excision of the mylohyoid ridge and suture of the mylohyoid muscle at a lower level. The deepened lingual sulcus and lowered mylohyoid muscle are maintained in place during the early phase of healing by stay sutures placed through a piece of catheter tubing intraorally and through the skin below the mandible extraorally.

The result permits deeper extension of the lingual denture periphery and affords definite lateral stability. There are no complications to be expected, and the technic, if followed carefully, can be tolerated by patients of all ages.

NEW HEAD APPLIANCE FOR USE IN PATIENTS WITH MAXILLOFACIAL INJURIES

William B. Irby and Gordon P. Gavin. J. Oral Surg. 13:297 Oct. 1955.

In the treatment of severely displaced facial fractures some method of extraoral traction frequently is necessary in order to restore and maintain the fractured segments in their original relation. The most common anchorage used in the past has been cranial, utilizing the plaster headcaps or one of the many other types of head appliances designed for this purpose.

Many disadvantages such as instability, discomfort, poor hygiene and tissue necrosis have been experienced with these appliances. An additional disadvantage has been that many severe facial injuries are complicated by head injuries, thus making the use of a headcap impossible.

An appliance designed at Tokyo Army Hospital has overcome these disadvantages by basing the anchorage below the mandibular and occipital level. This appliance has as its base an adjustable Forrester collar, which serves to maintain the head and trunk in a united relationship. On this base a versatile and adjustable framework of spring-steel wires is built. The various segments of the heavy wire are secured by single unit Roger Anderson clamps, and thus a cage is formed around the head. The wire cage is attached to the four posts of the Forrester collar by specially designed clamps. If the condition is complicated by chin lacerations, the chin pad is eliminated, and stability is accomplished by a forehead pad triangulated to the framework above.

The advantages of this appliance are: (1) stability under heavy traction from any direction; (2) elimination of the disadvantages of using the cranium as a base for support; (3) easy removal and replacement, thus allowing for adequate personal hygiene; (4) tolerance with a minimum of discomfort by the patient during the day and while sleeping.

TREATMENT OF NONUNION OF MANDIBULAR FRACTURES BY INTRAORAL INSERTION OF HOMOGENOUS BONE CHIPS

Robert B. Shira and Ogden M. Frank. J. Oral Surg. 13:306 Oct. 1955.

Nonunion is one of the complications in treatment of mandibular fractures. Growth of fibrous tissue between the fragments with concomitant eburnation of the bone ends accompanies the condition. Correction of the nonunion requires surgical exposure of the fracture site to permit removal of the interposed fibrous tissue and the eburnated portions of the bone fragments. Continuity of the bone must then be re-established either by direct approximation and wiring of the fragments or by insertion of a bone graft.

The bone most frequently used for the graft is taken from the patient's ilium. Although utilization of the iliac graft has many advantages, there are several disadvantages associated with its use: the pain and disability associated with obtaining the bone, the need for hospitalization of the patient, the necessity for complete sterility at the recipient site and the prolonged period of immobilization which is necessary.

Many of these disadvantages have been obviated by a technic in which homogenous bank bone chips are inserted into the site of nonunion through an intraoral approach. After the fragments have been established by a lingual splint, the involved region is approached by turning a mucoperiosteal flap. The recipient site is prepared by removal of all the fibrous tissue and eburnated bone. Homogenous bone chips, prepared from bank bone, are then packed into the resulting defect. The wound is closed and the fragments securely immobilized by utilization of the lingual splint supplemented by intermaxillary fixation.

Six patients have been treated successfully by this procedure; there was evidence of bony union in six weeks. In four, chronic infection with a purulent discharge was present, but in spite of this condition, the fracture site was prepared and bone chips inserted. Healing was rapid with complete resolution of the infection. The infectious process had no deleterious effect on the grafts.

Use of this technic is limited to instances where the defect is relatively small, where it occurs within tooth-bearing regions so immobilization of the fragments can be assured, and where approach to the site of nonunion is possible through an intraoral approach. It is not meant to replace the autogenous iliac graft for large defects and cannot be utilized unless support of the fragments can be obtained by a lingual splint. However, when indicated, the procedure insures excellent results in dealing with nonunion of the mandible and may be accomplished with minimal discomfort and inconvenience to the patient.

INTRAORAL REDUCTION OF MAXILLARY FRACTURES BY MALAR SUSPENSION

Melvin J. Sherman, D.D.S. J. Oral Surg. 13:321 Oct. 1955.

An intraoral approach is used for direct wiring to the malar bones to reduce and immobilize maxillary fractures. The technic allows the operator a reasonable amount of ease and safety in exposing the point of fixation on the malar bones and a minimum amount of surgical equipment. Stainless steel wires are then attached from the malar bones to any desired type of intraoral appliance used for controlling the fragments.

Direct wiring to the malar bones provides a means of complete and accurate reduction and immobilization of maxillary fragments and, when indicated, eliminates the use of external appliances.

CEMENTOMA OF THE MANDIBLE

Sanford M. Moose, D.D.S.; Wilbur K. Wirtz, D.D.S., and John K. Young, D.D.S. J. Oral Surg., 13:329 Oct. 1955.

An instance of cementoma of the mandible is reported for the purpose of illustrating clinically and roentgenographically the resemblance of the cementoma to certain types of odontomas and composite odontomas found similarly located in the mandible.

The Roger Anderson external skeletal fixation appliance is used to prevent surgical fractures which appear imminent or for the purpose of maintaining space and preventing collapse of fragments should fracture occur.

ANTIBIOTIC SYNERGISM AND ANTAGONISM: REVIEW OF THE LITERATURE

Irwin A. Small, D.D.S. J. Oral Surg. 13:324 Oct. 1955.

The most recent clinical experience indicates that antibiotics should not be combined haphazardly, and synergistic combinations should be used only when indicated. A plan of combined antibiotic action is discussed.

Antagonism is defined as a considerable decrease in the rate of bactericidal action and a reduction in the rate of cure of infections below that observed with a single drug. Synergism is defined as the ability of two drugs to increase considerably the rate of early bactericidal action or the rate of cure of experimental or clinical infections beyond that obtained by simple additive effects of the agents.

Antagonism and synergism may be demonstrated in dentistry when combinations of bacteriostatic and bactericidal antibiotics are used in root canal therapy. Penicillin is still the best single agent for treatment of oral infections. When a resistant organism is found, simple laboratory tests often are helpful in finding the drug most likely to succeed. In general it may be considered safe to combine agents of Group I (penicillin, streptomycin, bacitracin

and neomycin). Such combinations frequently are synergistic and never antagonistic.

The experimental basis and a tentative scheme for the combined action of antibiotics are reported. The variation in the response of microbial strains to drug combinations is stressed. This variation emphasizes the impossibility of labeling certain drug pairs as synergistic or antagonistic and stresses the desirability of laboratory guidance in those occasional difficult situations in which drug combinations are essential for cure.

MUCOUS CYST OF THE LOWER LIP IN A 12 MONTH OLD INFANT: REPORT OF A CASE

Ernest Baden, D.D.S. J. Oral Surg. 13:331 Oct. 1955.

Retention cysts of the salivary mucous glands occur on the lips, floor of the mouth, tongue, palate and cheeks. Little is known about the relative frequency of their appearance in different age groups.

In June 1953, a 12 month old infant was brought to the dental clinic because of a growth on the right side of the lower lip. The neoplasm had been noticed shortly after birth. It resulted in discomfort for the baby because of the progressive enlargement of the growth which interfered with normal feeding.

The cyst was excised under general anesthesia, and the diagnosis of mucous cyst was confirmed by histopathologic examination.

This report illustrates the fact that mucous cysts may develop in very young children and that they may become large enough to produce subjective symptoms. A thorough extraoral and intraoral examination should be an integral part of the pediatric examination for early detection of any abnormalities present in the mouth.

ANKYLOSIS OF THE MANDIBLE: REPORT OF CASE

Gerald Beiter, E. C. Hinds and S. Duane Waggoner. J. Oral Surg. 13:333 Oct. 1955.

A zygomatic fracture that had been repaired later apparently was refractured. Excessive bone deposition developed. As a result there was a considerable exostosis formed in the coronoid process which produced an absolute ankylosis.

An intraoral approach was found to be inadequate; therefore, an extraoral incision was made, and the cheek was reflected laterally. The entire coronoid process was removed, and the zygomatic arch reduced to approximately normal contour. The approach used in this procedure seemed to avoid both danger to the facial nerve and difficulties and complications in regard to the parotid gland.

After surgery, a clothespin type and an elastic traction type of bite opener appliance were used. These appliances gave considerable improvement in a short period of time, and the function of the mandible is considered good. The possible objection of external deformity because of scarring was, in this case at least, not significant.

PAGET'S DISEASE: REPORT OF CASE

Max B. Winslow. J. Oral Surg. 13:336 Oct. 1955.

Paget's disease or osteitis deformans is a skeletal disease characterized by rarefying osteitis with distortion of the bones affected. It occurs in middle life or later and causes a thickening and deformity of the bones involved. The disease is progressive, but does not, as a rule, shorten life. The nature and etiology are unknown. The most common sites are the femur and tibia, the pelvis, the vertebrae and the maxilla. The process is very slow as compared with hyperparathyroidism and results in an increase in the volume of bone, which becomes thick although porous.

An instance of Paget's disease in a 60 year old man is reported. Dental roentgenograms revealed large areas of osteoporosis and an altered pattern of bone. Osteoporosis was found also in the frontal and parietal bones.

Blood calcium and phosphorus levels were within normal limits, 10.5 and 2.9 mg. per 100 cc. respectively; however, the blood phosphatase tests were elevated and confirmed the roentgenographic and clinical impressions of osteitis deformans. Serum acid phosphatase was increased to 5.6 units from a normal of 0.0 to 1.0, and the alkaline phosphatase was increased to 5.14 units from a normal of 1.5 to 4.0.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

UNPUBLISHED SOURCE MATERIAL

In a recent issue of *Science*, there was brought to the attention of the members of the American Association for the Advancement of Science the undesirability of including unpublished material among the citations and bibliographical material. The important fact that such unpublished material is not immediately available to researchers is the one which prompts the suggestion that dental editors should also follow the examples of such eminent publications as *Public Health Reports* and *Science* and insist that no bibliography should contain inaccessible material. This proposal does not mean that a properly qualified personal communication should not be included. Its inclusion should, of course, be confined to the textual material.

Clifton O. Dummett, editor, Bulletin of the National Dental Association

ORAL LACTOBACILLI AND ANTIBIOTICS

In a recent article by Samuel Dreizen and others entitled "Studies on the Development of Tolerance to Selected Antibiotics by Susceptible Oral Lactobacilli" (J.A.D.A. 51:338 Sept. 1955), the authors refer to previous reports in which no significant differences in salivary lactobacillus counts were found between groups using control and penicillin-containing dentifrices. One of the references cited was an article by Fitzgerald and others (J.A.D.A. 41:62 July 1950). Dr. Dreizen suggests that one reason for Fitzgerald's negative observations may be the development of penicillin tolerance by the oral lactobacilli. He then proceeds to demonstrate that under *in vitro* conditions certain lactobacilli may be induced to become drug-resistant to a variety of antibiotics including penicillin.

Although we are in agreement that lactobacilli may be made antibiotic tolerant *in vitro*, it is obvious that the only way to answer satisfactorily the question of what happens under *in vivo* conditions is to examine the salivary lactobacilli of persons using antibiotic dentifrices.

This was done in the 1950 study by Fitzgerald and others. Every saliva sample was plated on tomato-juice agar containing penicillin. Under those conditions no increase in the number of penicillin resistant lactobacilli or the degree of resistance was noted after 18 and 24 months' use of a dentifrice containing penicillin. Although Dr. Dreizen correctly cited this report in connection with the failure to find differences in lactobacillus counts between the control and experimental groups, he apparently has overlooked the crucial observations in regard to the unchanged penicillin sensitivity of these organisms.

We feel, therefore, that it is desirable to remind readers of these earlier results in order that they might not arrive at erroneous conclusions from the *in vitro* observations of Dr. Dreizen and his coworkers.

Robert J. Fitzgerald, National Institute of Dental Research, Bethesda, Md.

MOUTH HYGIENE

One of the most neglected branches of dentistry since the profession's beginning is the correct teaching of mouth hygiene. Mouth hygiene should put special emphasis on the cleanliness and health of the gingiva.

Dentists look into dirty, septic mouths daily for years and do little or nothing to remedy the deplorable condition. They usually suggest only the one manner of brushing which now prevails—the up-and-down way. This method has been a dismal failure, as all dentists know,

but they seem to think that nothing can be done to improve matters. Actually, good oral hygiene can be achieved with dramatic ease for those who will follow the simple suggestions given here.

Today's toothbrushing habits pamper the gingiva, particularly the gingiva on the buccal side of the posterior teeth and the lingual side of the lower anterior teeth. It would help immeasurably if dentists always stressed brushing along the gingival margin.

Vertical brushing is awkward, time-consuming and ineffective. The Charter's method to which I add improvements is more thorough. Brisk, jiggly, horizontal gingival brushing with a serrated, tufted-type brush that reaches adequately behind the posterior teeth, into openings where teeth are missing and deeper into interproximal spaces and hidden crevices or irregular teeth does an excellent job. And it does not cause the gingiva to recede so that teeth have to be extracted as some dentists suppose.

The real damage to the gingiva comes from vertical brushing which allows tartar to accumulate because the method is so awkward and ineffective that people become careless. The gingiva is really clean and healthy only when the horizontal manner of gingival and tooth brushing as recommended is a regular habit.

C. W. Garleb, St. Louis

Deaths

May, Albert E., Jackson, Mich.; Indiana Dental College, 1919; died July 1; aged 61.

Rankin, Daniel, Brockton, Mass.; Dental School, Tufts College, 1922; died June 24; aged 54.

Reisling, Frank C., Sulphur Springs, Ark.; College of Dentistry, Ohio State University, 1901; died March 4; aged 80.

Reissman, Jacob, New York; New York College of Dentistry, 1915; died July 4; aged 61.

Render, Lee O., Perry, Okla.; Louisville College of Dentistry of Centre College, 1906; died July 17; aged 74.

Richardson, James A., Milwaukee; Dental School, Marquette University, 1927; died June 27; aged 51.

Richeson, James F., Sidney, Ohio; College of Dentistry, Ohio Medical University, 1896; died July 2; aged 83.

Richter, G. Herbert, White Plains, N. Y.; Dental School, Harvard University, 1929; died July 8; aged 52.

Ripper, Rudolph, Washington, D. C.; died July 4; aged 73.

Robinson, John F., Roanoke, Va.; Dental Department, Baltimore Medical College, 1907; died January 11; aged 69.

Robison, Kenneth H., South Bend, Ind.; Chicago College of Dental Surgery, Loyola University, 1918; died April 14; aged 58.

Ronkin, Samuel H., New York; School of Dentistry, University of Pennsylvania, 1919; died June 27; aged 59.

Rubsam, Charles W., New York; College of Dental and Oral Surgery, New York, 1911; died May 25; aged 65.

Rudman, Harry E., Lebanon, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1903; died July 21; aged 76.

Ruszkowski, Walter T., Chicago; Chicago College of Dental Surgery, Loyola University, 1926; died July 22; aged 54.

Sager, Albert E., Rochester; School of Dentistry, University of Pennsylvania, 1899; died April 6; aged 84.

Sanford, Earl W., Marlette, Mich.; College of Dental Surgery, University of Michigan, 1899; died May 30; aged 80.

Sawyer, Burt R., White River, S. D.; College of Dentistry, University of Iowa, 1903; died June 17; aged 75.

Schmeling, Arthur W., Winona, Minn.; Chicago College of Dental Surgery, Loyola University, 1911; died May 10; aged 66.

Schoder, Franklin C., Sandusky, Ohio; College of Dentistry, Western Reserve University, 1932; died in July; aged 49.

Schraft, Albert C., San Francisco; College of Physicians and Surgeons, San Francisco, 1912; died July 7; aged 78.

Schwikert, Stewart E., Detroit; Dental School, Northwestern University, 1932; died June 7; aged 47.

Shalek, Victor J., Oak Park, Ill.; College of Dentistry, University of Illinois, 1917; died March 23; aged 59.

Shankroff, Louis, East Quogue, N. Y.; New York College of Dentistry, 1912; died June 3; aged 68.

Shattuck, Shirley S., Everett, Mass.; Dental School, Harvard University, 1902; died July 11; aged 75.

Sheets, John A., Traverse City, Mich.; School of Dentistry, St. Louis University, 1924; died April 25; aged 60.

Shissler, Everett E., Chicago; Dental School, Northwestern University, 1929; died June 25; aged 50.

Sugnet, Edward L., Buffalo; School of Dentistry, University of Buffalo, 1902; died July 9; aged 77.

Tanner, Edgar T., Jefferson City, Mo.; School of Dentistry, St. Louis University, 1916; died August 14; aged 64.

Tarr, Charles B., Melrose, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1891; died in July; aged 101.

Thayer, Robert F., Oakland, Calif.; College of Physicians and Surgeons, San Francisco, 1924; died July 3; aged 59.

Thornton, Francis X., St. Louis; School of Dentistry, St. Louis University, 1924; died July 7; aged 56.

Tobin, Olney T., Chicago; Dental Department, Meharry Medical College, 1924; died July 19; aged 59.

Vickers, Earl K., Granite City, Ill.; School of Dentistry, St. Louis University, 1925; died June 27; aged 62.

Walker, Daniel J., Chicago; School of Dentistry, University of Buffalo, 1917; died July 18.

Weisman, Morris, Elmont, N. Y.; College of Dental and Oral Surgery, New York, 1923; died June 20; aged 58.

Weiss, Henry, Rockaway Park, N. Y.; died June 15; aged 64.

Wicks, Edwin H., Flushing, Mich.; Department of Dental Surgery, Detroit College of Medicine, 1898; died in May; aged 81.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N. J.
Ninety-Eighth Annual Session	Nov. 4-7, 1957	Miami, Fla.
Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 15-17	Biloxi, Miss.	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska	Aug. 15-18	Fairbanks	J. L. Irby	1010 Noble St., Fairbanks
Arizona	Apr. 11-14	Tucson	R. W. Christensen	17 E. Welden Ave., Phoenix
Arkansas	Apr. 8-11	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 23-25	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 30-May 2	Los Angeles	J. P. Bowers	903 Crenshaw Blvd., Los Angeles
Colorado	Oct. 21-24	Colorado Springs	W. R. Humphrey	724 Republic Bldg., Denver
Connecticut	May 2-4	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 9	Wilmington	J. C. Gantt	1102 Madison St., Wilmington
District of Columbia	Mar. 11-14	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	May 28-30	Miami Beach	W. A. Buhner	167 Broadway, Daytona Beach
Georgia	Oct. 21-24	Savannah	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	Sept. 10-15	Maui Island	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	Sept. 27-29	Sun Valley	D. E. Sonius	125 Fourth Ave., N., Twin Falls
Illinois	May 14-16	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria
Indiana	May 21-23	Indianapolis	D. C. Barnhill	409 Bankers Trust Bldg., Indianapolis
Iowa	May 6-9	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 14-17	Topeka	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Apr. 8-11	Louisville	A. B. Coxwell, Jr.	1976 Douglas Blvd., Louisville
Louisiana	Apr. 11-14	Alexandria	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 21-23	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 7-9	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 6-9	Boston	H. E. Tingley	12 Bay State Rd., Boston
Michigan	Apr. 16-19	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 23-25	St. Paul	C. V. E. Cassel	225 Hamm Bldg., St. Paul
Mississippi	June 10-13	Biloxi	B. A. Cohen	306 Plaza Bldg., Jackson
Missouri	May 6-9	Jefferson City	E. D. Suggett	201 Merchants Bank Bldg., Jefferson City
Montana	May 3-6	Helena	E. G. Vedova	Box 311, Roundup
Nebraska	Apr. 30-May 3	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	May 7-9	Las Vegas	O. M. Seifert	506 Humboldt St., Reno
New Hampshire	June 24-27	Rye Beach	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 23-25	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 20-24	Santa Fe	J. S. Eilar	Medical Arts Square, N.E., Albuquerque
New York	May 14-16	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 13-16	Pinehurst	R. D. Coffey	Box 270, Morganton
North Dakota	May 6-9	Minot	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio			E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 22-25	Oklahoma City	S. A. Russaman	809 Medical Arts Bldg., Oklahoma City
Oregon	Mar. 5-7	Portland	T. D. Holder	308 Selling Bldg., Portland
Panama Canal Zone	April 21		J. J. Dunne	5700 Dispensary, Albrook Air Force Base
Pennsylvania	Apr. 19-21	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 26-28	San Juan	M. A. Rosso	409 Parque St., Santurce, San Juan

State	Date	Place	Secretary	Address
Rhode Island	Jan. 17, 18	Providence	W. D. MacIntosh	506 Industrial Bank Bldg., Providence
South Carolina	May 6-8	Spartanburg	J. R. Owings	7 Medical Court, Greenville
South Dakota	May 13-16	Huron	L. N. Thelen	229 S. Prairie St., Sioux Falls
Tennessee	Apr. 30-May 3	Memphis	A. M. Ballentine	Pulaski
Texas	Apr. 29-May 2	Fort Worth	W. Ogle	3707 Gaston Ave., Dallas
Utah	May 17-19	Salt Lake City	R. C. Dalgleish	124 State Capitol Bldg., Salt Lake City
Vermont	May 20-22	Manchester	E. H. Van Santvoord	128 Merchants Row, Rutland
Virginia	May 9-12	Roanoke	W. T. McAfee	705 Colonial National Bank Bldg., Roanoke
Washington	Mar. 22-24	Seattle	W. B. Martin	Medical-Dental Bldg., Seattle
West Virginia	July 22-25	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 9-11	Milwaukee	A. E. Kopp	Wells Bldg., Milwaukee
Wyoming	June 14-16	Cody	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama			W. L. McCarty	200 Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			R. K. Trueblood	107 East A Ave., Glendale
Arkansas	June 18-22	Little Rock	W. T. Jones	107 E. Shelton, Monticello
California	Jan. 30	San Francisco	T. E. Tilden	Medico-Dental Bldg., Sacramento
	June 18	Los Angeles		
	July 23	San Francisco		
Colorado	June 25-29	Denver	J. M. Peabody	724 Republic Bldg., Denver
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia	Jan. 9-13	Washington	W. T. Birthright	Suite 718, 1835 Eye St., N.W., Washington
Florida	July 9-19*†	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			P. M. McNeil	307 First National Bank Bldg., Rome
Hawaii			H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho			A. G. DeWinter	Sun Bldg., Boise
Illinois	June 26-29‡		W. A. McKee	503 Wood Bldg., Benton
	Nov. 27-30‡			
Indiana			C. A. Frech	Gary National Bank Bldg., Gary
Iowa	May 28-June 1*†	Iowa City	P. A. Hahn	302 Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			J. J. Kelly	Franklin
Louisiana	June 3-8	New Orleans	R. C. Steib	833 Maison Blanche Bldg., New Orleans
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland			H. Levin	3429 Park Heights Ave., Baltimore
Massachusetts			T. J. Glennon	323 Main St., Woburn
Michigan	Jan. 29-Feb. 4	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit
	June 10-16			
Minnesota	Jan. 9-13‡		M. G. Walls	615 Montcalm Place, St. Paul
	June 11-15‡			
Mississippi	Jan. 5-7‡		J. C. Boswell	508 Lamar Bldg., Jackson
	June 19-21‡			
Missouri			R. R. Rhoades	414 Central Trust Bldg., Jefferson City
Montana			R. O. Betzner	303 Power Block, Helena
Nebraska	June 11-16	Lincoln	H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada			R. Whitehead	Suite 6, Masonic Temple, Reno
New Hampshire	June 21, 22*	Boston	S. G. Markos	8 Renaud Ave., Dover
	June 21†			
New Jersey			W. A. Wilson	150 E. State St., Trenton
New Mexico			J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany
North Carolina			F. O. Alford	1107 Liberty Life Bldg., Charlotte
North Dakota	July 9-13	Fargo	T. M. Flath	Williston
Ohio			H. B. Smith	322 E. State St., Columbus
Oklahoma			W. E. Cole	563 First National Bank Bldg., Oklahoma City
Oregon		Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania	June 18-23*†	Philadelphia	A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
		Pittsburgh		
Puerto Rico			J. Mercado C.	Box 3717, Santurce

State	Date	Place	Secretary	Address
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			J. L. Gunter	1226 Pickens St., Columbia
South Dakota			H. T. Aker	Canton
Tennessee			C. R. Aita	619 Bennie Dillon Bldg., Nashville
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			G. W. Vogel	422 Eccles Bldg., Ogden
Vermont			P. M. Fitch	Newport
Virginia			J. M. Hughes	715 Medical Arts Bldg., Richmond
Washington			M. L. Mower	National Bank of Commerce Bldg., Olympia
West Virginia	June 25-27*†	West Liberty	J. B. Davis	501 Goff Bldg., Clarksburg
Wisconsin	June 4-8*†	Milwaukee	S. F. Donovan	Tomah
Wyoming			W. A. Hocker	210 O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. §Approximate dates—verify with state dental examining board.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Apr. 29-May 6	Colorado Springs	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Crown and Bridge Prosthodontics	Feb. 4, 5	Chicago	E. C. Brooks Secy.	4500 Olive St., St. Louis
American Academy of Dental Medicine	June 21-24	Detroit	G. J. Witkin Secy.	45 S. Broadway, Yonkers, N. Y.
American Academy of Implant Dentures	Feb. 4	Chicago	P. S. Loechler Secy.	540 N. California, Stockton, Calif.
American Academy of Maxillofacial Prosthetics	Feb. 1-4	Chicago	A. H. Bulbulian Gen. Chm.	Mayo Clinic, Rochester, Minn.
American Association of Endodontists	Feb. 4, 5	Chicago	V. B. Milas Secy.	7559 W. 63rd St., Chicago
American Association of Industrial Dentists	Apr. 24-26	Philadelphia	E. R. Aston Secy.	South Office Bldg., Harrisburg, Pa.
American Board of Pedodontics	Feb. 2-4	Ann Arbor, Mich.	R. L. Ireland Secy.	College of Dentistry, University of Nebraska, Lincoln, Neb.
British Dental Association	June 25-29	Brighton, Sussex, England	H. P. Buchanan Secy.	13 Hill St., Berkeley Sq., London, England
Canadian Dental Association	June 3-6	Banff, Canada	R. L. Rasmussen	615 Greyhound Bldg., Calgary, Alberta, Canada
Chicago Dental Society	Feb. 5-8	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave. Chicago
Council on Dental Education, Dental Aptitude Tests	Jan. 6, 7		S. Peterson Secy.	222 E. Superior St., Chicago
Dallas Mid-Winter Dental Clinic	Jan. 22-25	Dallas, Texas	W. W. Sherrill Exec. Secy.	2921 Fairmount, Dallas, Texas
Denver Dental Association	Jan. 8-11	Denver	B. Kletzky Secy.	Republic Bldg., Denver
Federation Dentaire Internationale	May 28-June 3	Zurich, Switzerland	G. H. Leatherman Secy. Gen.	35 Devonshire Place, London, England
Fourteenth Australian Dental Congress	Mar. 5-9	Melbourne, Australia	H. R. Cash Pres.	49 Mathoura Rd., Toorak, Australia
Greater Philadelphia Annual Meeting	Feb. 1-3	Philadelphia	J. H. Eshleman Secy.	Suite 337, Bellevue-Stratford Hotel, Broad and Walnut Sts., Philadelphia
National Board of Dental Examiners	Apr. 2, 3		G. J. Casey Secy.	222 E. Superior St., Chicago
Ninth District Dental Society of Montana Midwinter Meeting	Jan. 19-21	Billings, Mont.	C. H. Betzer Secy.	2820 9th Ave., N., Billings, Mont.
Northeastern Dental Society	June 3-6	Swampscott, Mass.	M. J. Frasca Secy.	153 Cabot St., Beverly, Mass.
Thomas P. Hinman Mid-Winter Clinic	Mar. 18-21	Atlanta, Ga.	D. H. Simpson Gen. Chm.	808 Medical Arts Bldg., Atlanta, Ga.

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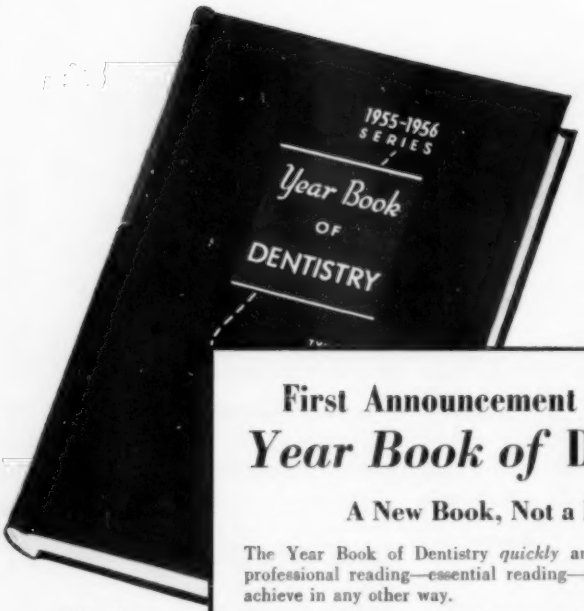

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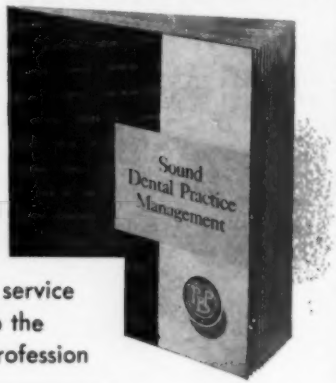

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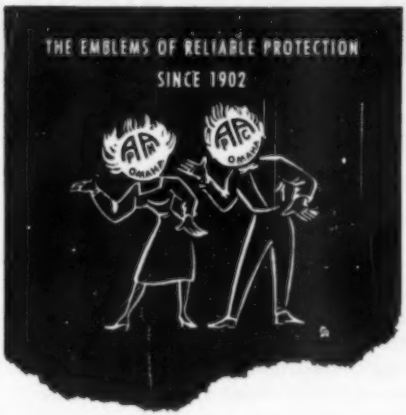

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1. Sebrell, W. H., Jr.: Trends and Needs in Nutrition, J.A.M.A. *152*:42 (May 2) 1953.
2. King, C. G.: Newer Concepts of Optimum Nutrition, Food Technol. *8*:486 (Nov.) 1954.
3. Kelly, H. T.: Impact of Modern Nutrition on Twentieth Century Morbidity, Pennsylvania M.J. *58*:481 (May) 1955.
4. Sherman, H. C.: Chemistry of Food and Nutrition, ed. 8, New York, The Macmillan Company, 1952, p. 212.
5. Joint Report of the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association: Sugar and Dental Caries: The Effect on the Teeth of Sweetened Beverages and Other Sugar-Containing Substances, J. Am. Dent. A. *47*:387 (Oct.) 1953.
6. "The Care of Children's Teeth," in Questions and Answers, 1954, American Dental Association, p. 14.

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Riboflavin	0.21 mg.	18	10	13	15
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Iron	3.3 mg.	41	22	28	28
Calories	379	24	12	11	16

*National Research Council's recommended daily dietary allowances (1953): Children (ages, 4 to 6 years); weight, 40 lbs.; height, 43 inches. Boys (ages, 13 to 15 years); weight, 108 lbs.; height, 64 inches. Men (age, 25 years); weight, 143 lbs.; height, 67 inches. Women (age, 25 years); weight, 121 lbs.; height, 62 inches.

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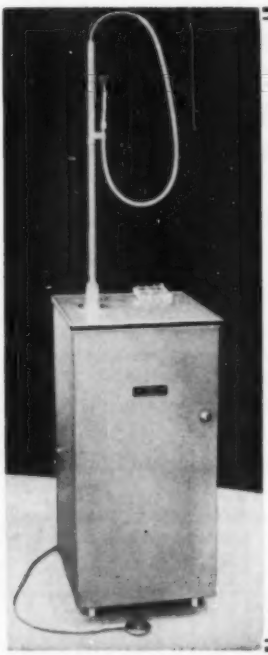

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*JADA Vol. 47, P. 324-329, Sept. 1953. NELSEN, R. J., D.D.S.; PELANDER, C. E.; KUMPULA, J. W.: Hydraulic Turbine Contra Angle Handpiece. (Reprint on request)

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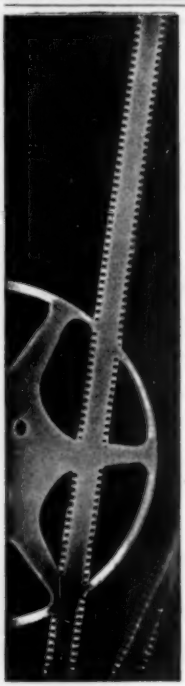

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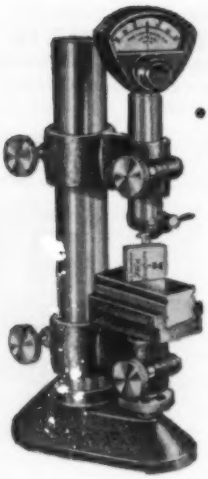

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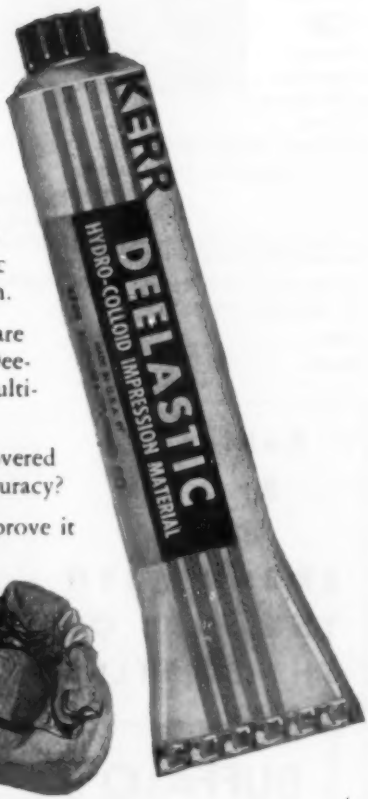

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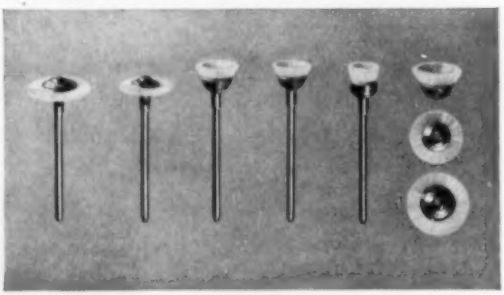

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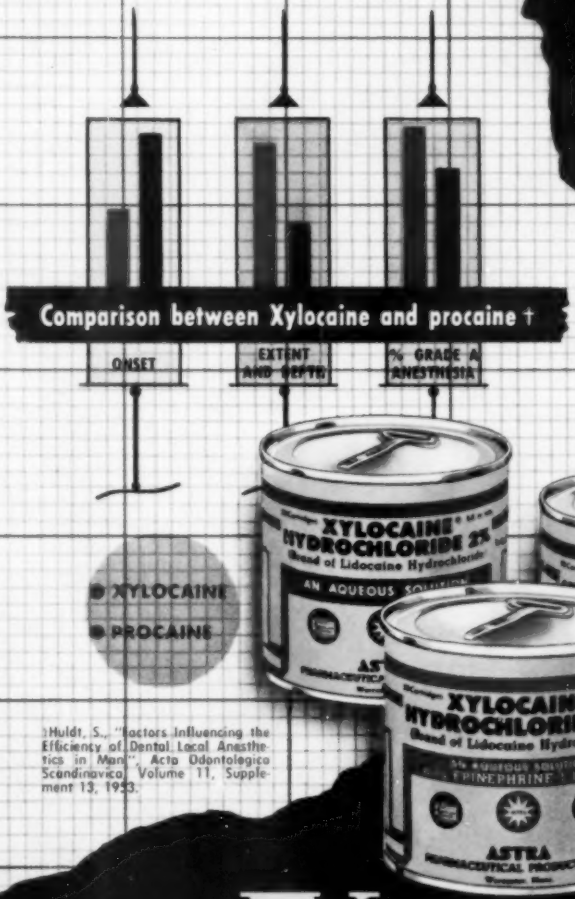

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†Huldt, S., "Factors Influencing the Efficiency of Dental Local Anesthetics in Man", Acta Odontologica Scandinavica Volume 11, Supplement 13, 1953.

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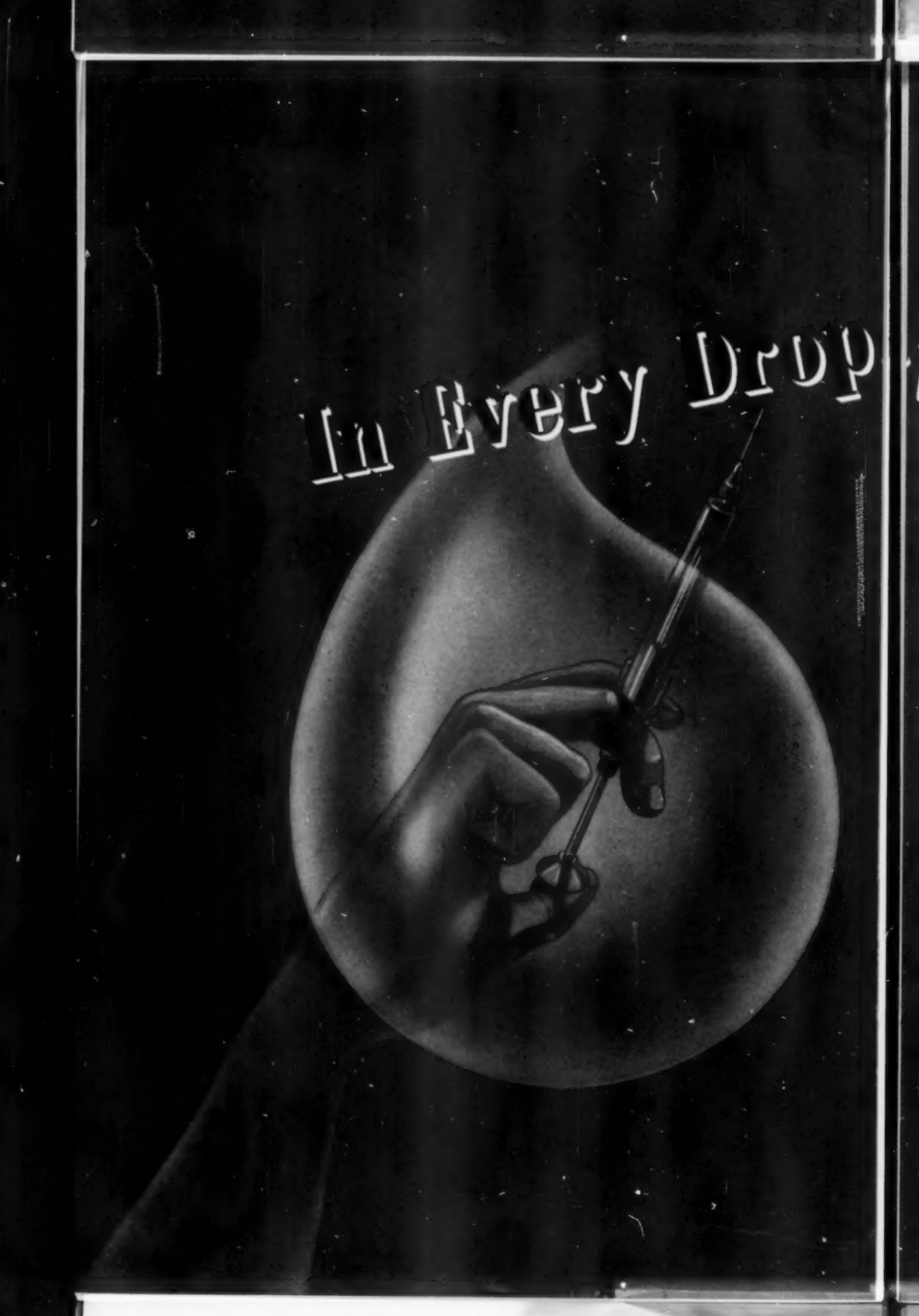
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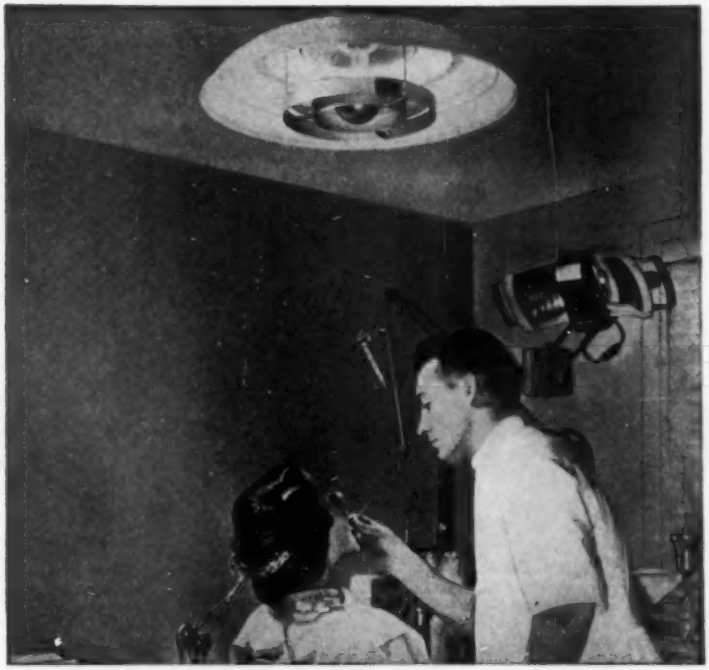

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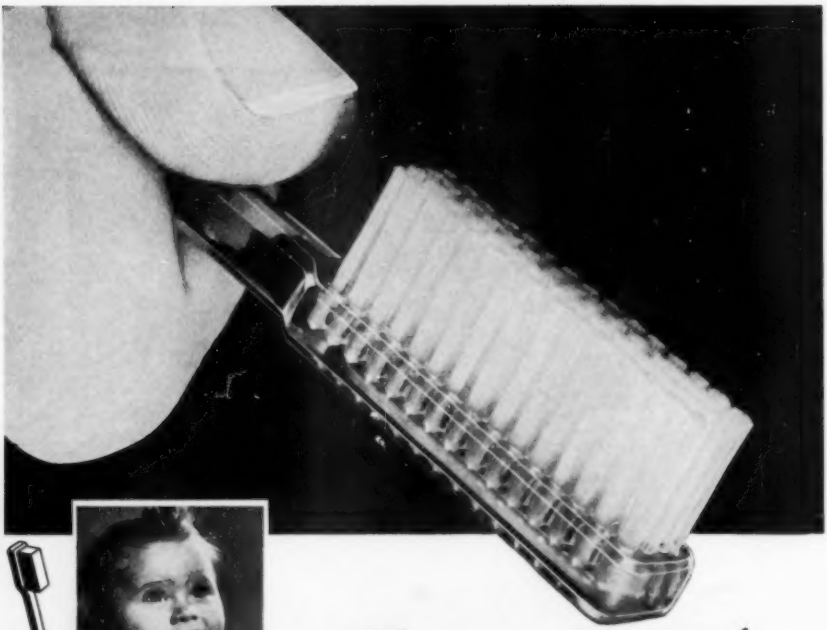

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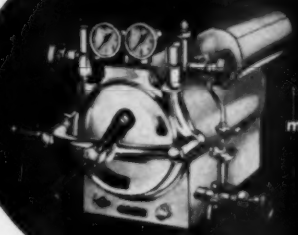

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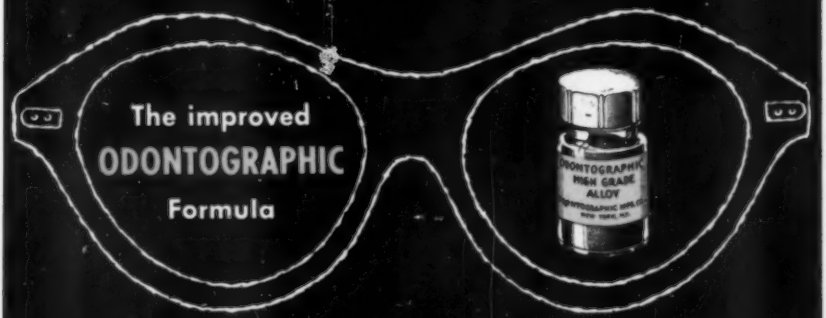

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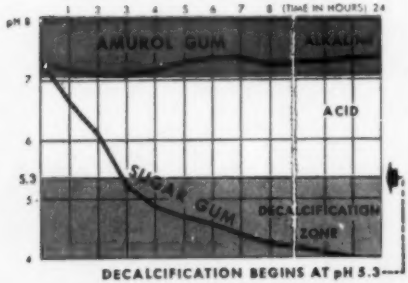

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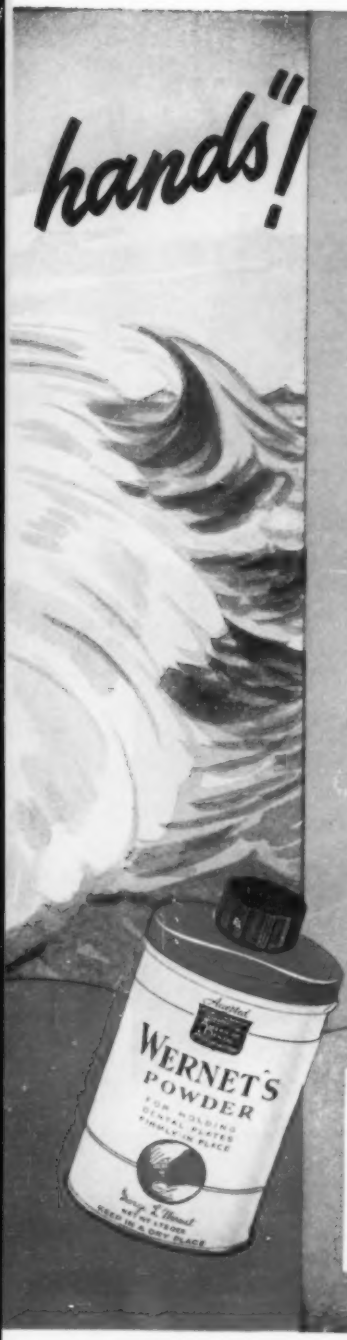

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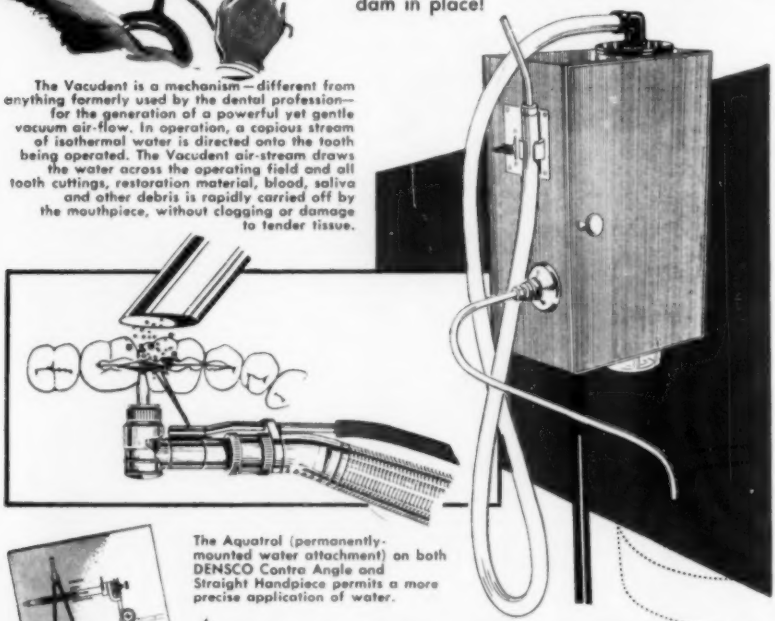

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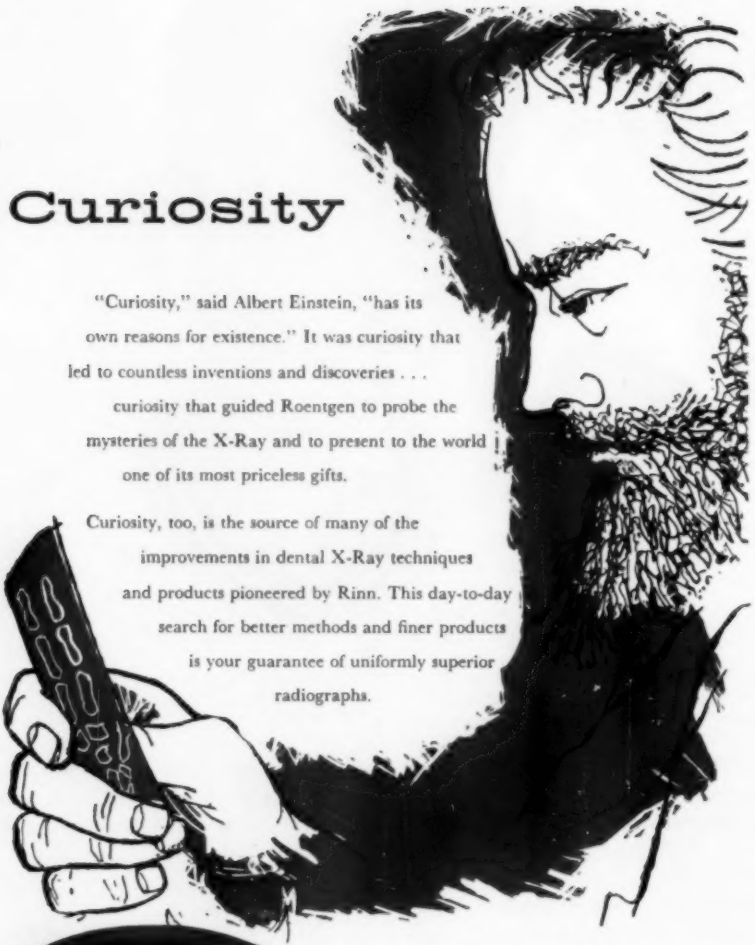

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1. Am. Dent. Assoc.: Diet and Dental Health. 1954, p. 8.
2. Thomas, A. E.: Oral Surg., Oral Med. & Oral Path. 7:741-749, 1954.

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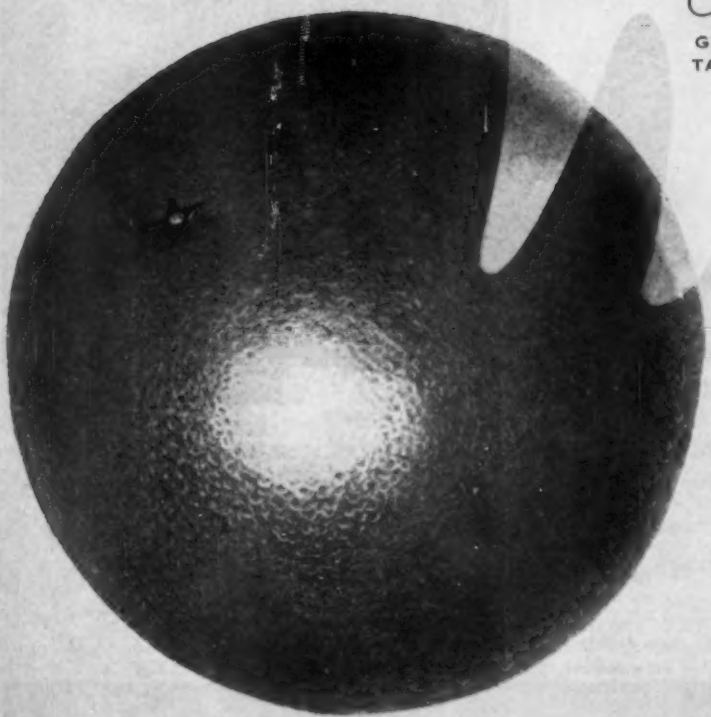

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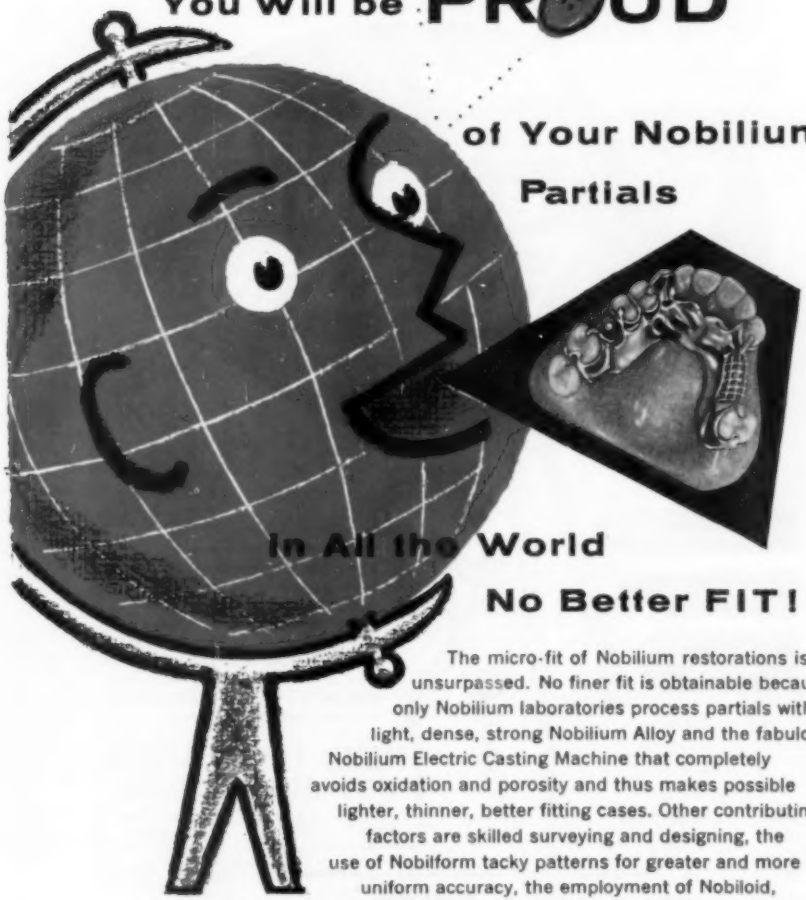

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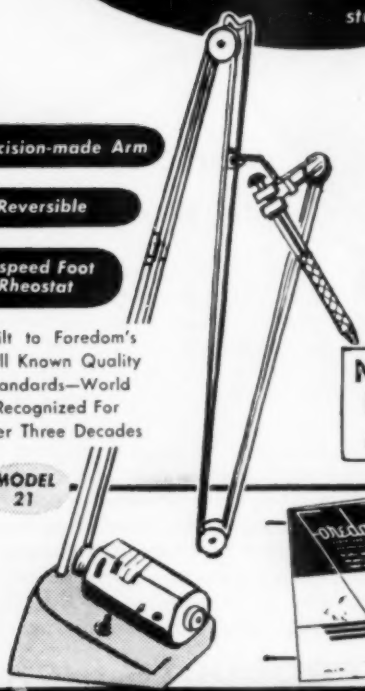

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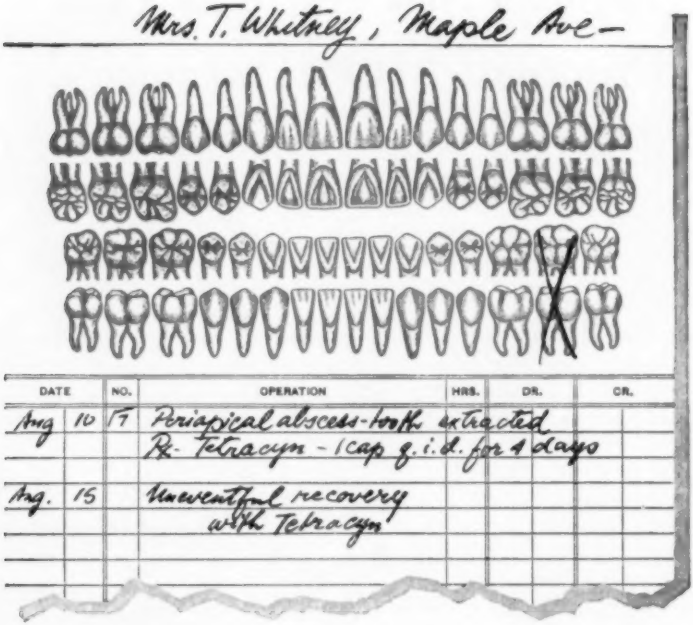

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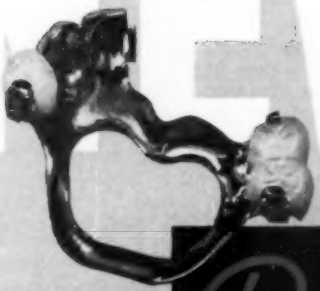

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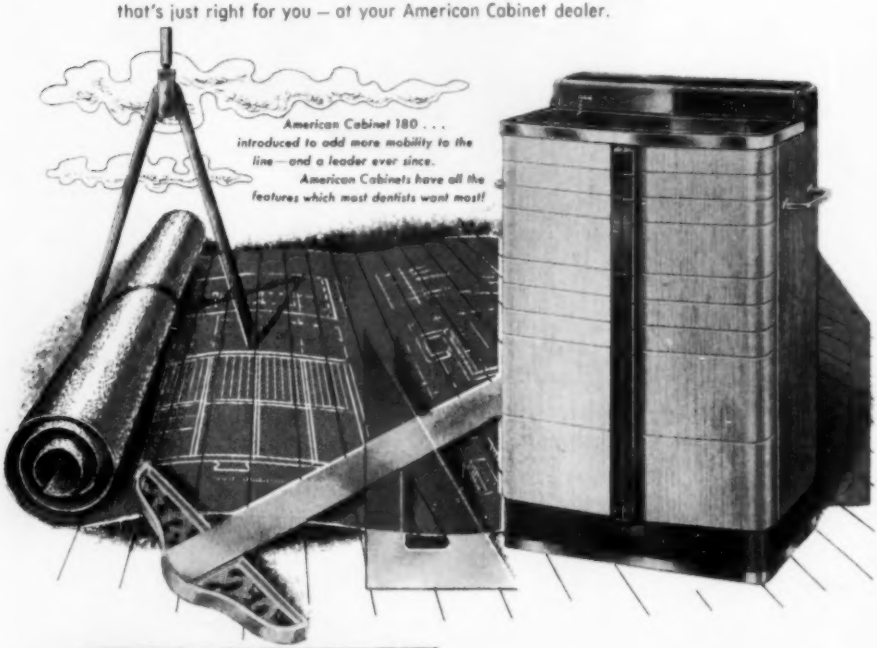

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Patients accept dental care more readily when the fear of pain is allayed. By making BUFFERIN a part of your pre- and post-treatment routine you can minimize the discomfort of dental procedures, and thus gain the cooperation of your patients. The side effects, nausea, heartburn, which follow the use of straight aspirin by some patients, are markedly less when BUFFERIN is the analgesic used.

Accepted COUNCIL on DENTAL THERAPEUTICS AMERICAN DENTAL ASSOCIATION

GIVE **BUFFERIN.**

Acts Twice as Fast as Aspirin
Does Not Upset the Stomach

Each BUFFERIN tablet contains 5 grains of acetylsalicylic acid and the antacids aluminum glycinate and magnesium carbonate.

BRISTOL-MYERS COMPANY, 19 West 50 St., New York 20, N. Y.

CONSTANT COLOR RELATION

with

TRUBYTE® *Biotone*® TEETH

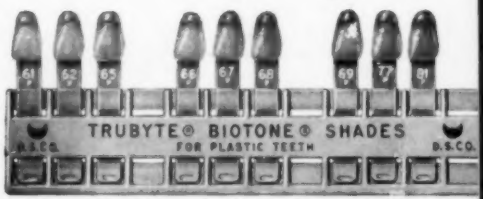
the new balanced formula plastic teeth with the high fidelity shades

Yes, there is something new in plastic tooth shades...it's the important element known as Constant Color Relation...built into Trubyte Biotone Teeth.

Trubyte Biotone Teeth are made from an entirely new plastic formula which provides important new optical and color qualities. This new formula, plus new shade blending methods, introduces a new naturalness of color, improved translucence, fluorescence and color absorption, and a greater natural vitality of appearance.

Trubyte Biotone shades are high fidelity, natural appearing plastic tooth shad Unlike conventional plastic teeth, these new shades do not "gray out" in the mouth. T is important in your tooth selection because it saves your time. Constant Color ation eliminates the resets and remakes so commonly observed with conventional plastic tooth shades, which invariably appear darker and grayer in color in the mouth than they do on the shade guide or on the card.

For natural esthetics in plastic teeth, specify Trubyte Biotone shades . . . use the new Trubyte Biotone Shade Guide to specify shades for Trubyte Biotone Anteriors, Trubyte Biotone Pilkington-Turner Posteriors.



THE DENTISTS' SUPPLY COMPANY OF N. Y., York, Pennsylvania